MARCH, 1946

Orthodontics

Office of the Editor: 8022 Forsythe Boulevard, St. Louis
Published by The C. V. Mosby Company, St. Louis

American
Journal of Orthodontics
and Oral Surgery

VOL. 32 MARCH, 1946 No. 3

Original Articles

SOME ORTHODONTIC PROBLEMS IN HISTOLOGIC ILLUMINATION

B. GOTTLIEB,* DALLAS, TEXAS

HISTOLOGY has to be considered as an extension of clinical observation. No borders exist between both kinds of observation. Histology is supposed to investigate things which are beyond the limits of observation with the naked eye, that is, clinical observation. The findings of both must be an entity, provided that both kinds of observation are based on the same foundation—sound common sense. Observation, as well as common sense of interpretation, are not things which can be checked in a handbook, like valid laws. Accordingly, we must go further in our differentiation.

Reported observations are facts which have to be 100 per cent reliable. If some mistakes have been made in the observation of the facts, the whole work must be considered as invalid. Our attitude towards explanation of the facts must be quite different. Each author offers his best explanation of the facts which he found. That explanation remains valid as long as no better explanation is offered. If histologic findings and their explanations do not agree with clinical experience, we must do our best to find out the mistake.

If the clinical and the research men are both basing their way of thought on the spirit of cooperation, the relationship between both will be raised above the present level of zero. Let us try to discuss some orthodontic problems in this spirit.

ARE WE JUSTIFIED IN TALKING ABOUT TOO STRONG FORCES IN ORTHODONTICS?

We have to consider both sides of the moved tooth; the side of pressure and the side of traction. The following illustrations will furnish the desired information.

Read before the New York Orthodontic Society, March 5, 1946.

*From the Research Department of Baylor University College of Dentistry, The photographic prints were made by Chas. Ervin Arnold, Dallas, Texas.

Figs. 1, 5, and 6 are roots of dogs' first molars on which cast crowns were cemented on the opposing teeth, with oblique occlusal planes. The teeth were thus moved in opposite directions. It cannot be stated if the different animals brought their teeth into pressing contact at the same rate of time and strength in endeavoring to bring their exarticulated teeth into contact. Differences of temperament may account for individual differences in the time which was needed for achieving a certain effect. What we shall try to learn from such experiments is entirely independent of the temperament of the experimental animal.

Fig. 1 shows the apex of such a tooth with an experimental duration of one week. The root (*a*) is in contact with the bone (*b*), on the side of pressure. A periodontal membrane is present only in the upper and lower parts of the illustration (*c*). At the contact we see some necrotic material (*d*). Otherwise, the tissue of the periodontal membrane here was entirely destroyed between the two hard walls which pressed against each other. That contact between tooth and bone determines the *limit* of the tooth movement. No matter how much you increase the force, a further movement of the tooth is *impossible*. If we use ligatures, we will rupture them trying to achieve further movement. The rupture of a tightened ligature seems to be a sign of existing contact between tooth and bone.

The theoretical ideal of tooth movement is the compression of the periodontal membrane to such a degree that it can perform frontal resorption of the bone* and furnish place for further tooth movement, without damaging the connective tissue of that periodontal membrane. Orthodontics can never be in command of a technique which can assure such results during the entire treatment of any case. Not even the most carefully constructed springs are reliable continuously. Orthodontics cannot be blamed for that fact, changing tissue reaction being responsible.

Let us assume that we started moving a tooth with an adequate force, so that the compression of the periodontal membrane produced just a stimulus for resorption. We take it for granted, though not justified, that we succeeded to take into account the length of the root and the structure of the affected periodontal membrane. The longer the root is and the better the periodontal fibers are arranged, the stronger will have to be the *applied* force in order to achieve the desired stimulation. After a number of days we decide that the first stimulation for bone resorption is exhausted and we have to renew the force. We now apply the same force as the first time. This same force is bound to be too strong. The force used the first time caused bone resorption to a certain extent. The fibers which were fixed to this resorbed bone are out of function. Let us take, as an instance, that 20 per cent of the inner lining of the alveolar bone was resorbed. Accordingly, the fixation of the root is decreased at the rate of 20 per cent, which is the background for the looseness of an orthodontically moved tooth. We use, then, the second time, a

*Gottlieb, B.: Am. J. Orthodontics and Oral Surg. 28: 167, 1942.

force which is 20 per cent stronger than that which the existing fibers in function can take. The result will be that we compress the periodontal membrane too much and get contact between tooth and bone. It seems justified to state that hardly one single orthodontic treatment has ever been finished without bringing tooth and bone into contact at least once.

We have found that the natural limitation of tooth movement is contact between tooth and bone. No technique can eliminate that possibility. Correspondingly, there seems to be no use for a discussion about using too strong forces from the point of view of the side of pressure. *No force can achieve more than contact between tooth and bone, and no technique can avoid it.*

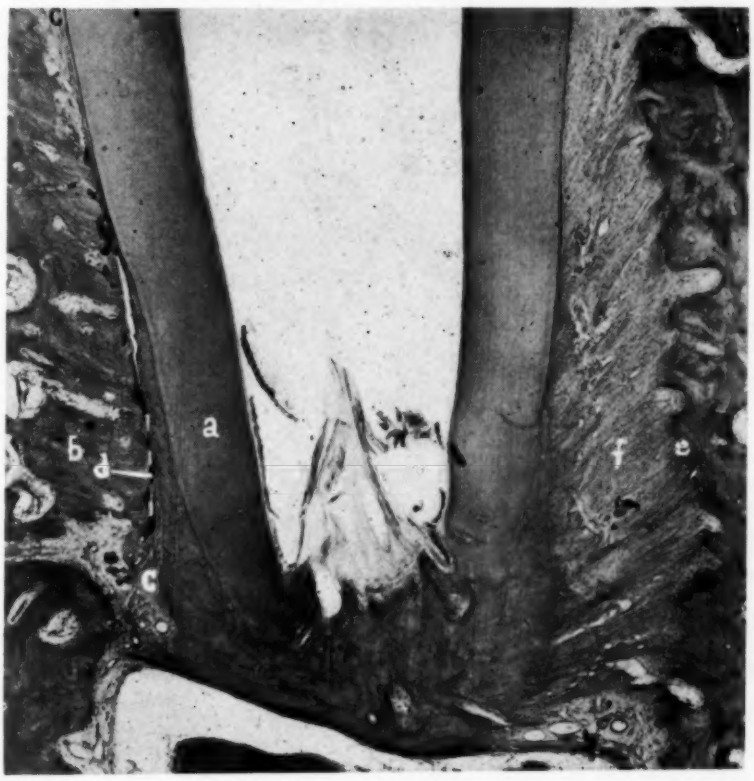


Fig. 1.—Dog's tooth under experiment of cemented caps for one week. *a*, Tooth; *b*, bone; *d*, destroyed periodontal membrane; *c*, periodontal membrane; *e*, bone border on the side of traction; *f*, periodontal membrane on the same side.

It was generally believed that the only orthodontic problem was located on the side of pressure. Recently, however, the side of traction was considered to be a problem. Fig. 1 shows the side of traction on the right side. The periodontal width is increased considerably. Considering that the width of the periodontal membrance on the side of pressure is zero, no reasonable arithmetical relationship can be found between it and the periodontal width of the side of traction. The borderline of the bone here (*e*) appears aplastic, but in the upper part traces of bone deposition can be found. The periodontal fibers (f) are stretched considerably. Nowhere can they be found torn and

nowhere is bleeding to be found. We would like to find out if an increase of that traction could possibly produce damage. However, *the contact on the side of pressure prevents any further increase of traction,* therefore this is not possible.

Fig. 2.—Dog's incisor, moved by ligature for forty-eight hours. Ligature was renewed four times. *a*, Newly formed bone trabeculae on traction; *b*, continuously deposited cementum; *c*, widened periodontal membrane; *d*, cell accumulations in the path of bone formation. Traction at apex.

We have mentioned that due to the unreliability of the muscle action we cannot bring into an exact relationship the duration of the experiment with the tissue reaction. The tooth of Fig. 2 was moved by ligature to an arch for forty-eight hours. During that time the ligature was renewed four times. The periodontal membrane at the alveolar margin on the side of pressure was entirely compressed and necrotic. We see here on the apical side of traction a considerable widening of the periodontal membrane (*c*). Formation of new bone (*a*) started in several places. A denser accumulation of cells (*d*) indicates the places where bone is going to be formed. The noncalcified cementum strip (*b*) has apparently nothing to do with the experiment. It represents the normal, continuous cementum deposition.

Fig. 3 is the side of traction at the alveolar margin of the same tooth. The periodontal membrane (*b*) is widened, the opposite pressure side being

compressed into contact with the bone. The width of that periodontal membrane is apparently double its normal width, that being the maximum that can be achieved in movement. Among the newly formed bone trabeculae is one on the gingival margin which is remarkable (*a*). It illustrates the possible amount of bone deposition on a traction stimulus for the duration of forty-eight hours. We cannot imagine a stronger force than a ligature renewed four times during forty-eight hours. Nevertheless, we do not see any damage on the side of traction, only ideal response to the stimulus, by starting formation of new bone trabeculae.

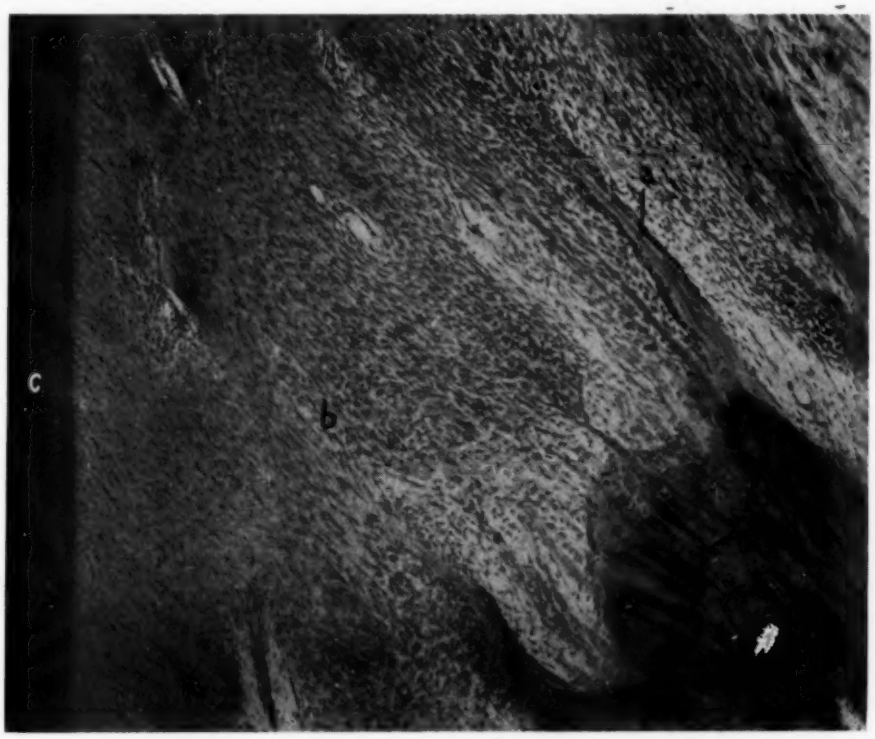


Fig. 3.—Alveolar margin on side of traction of tooth in Fig. 2. *a*, Newly formed bone trabecula; *b*, widened periodontal membrane; *c*, tooth.

By not paying too much attention to the time element of the experiments with the cemented crowns, we can get much useful and practical information from them. Fig. 4 shows such an experiment, like Fig. 1, but with a duration of three weeks. On the side of pressure the contact between tooth and bone consists of two parts (*a*), and is under liquidation. Osteoclasts (*b*) are at work in several places in order to remove the contacting bone and free the tooth surface. At *c* we see the continuous deposition of new cementum going on. At the side of traction we see three apposition lines in the bond (*d*, d_1, d_2). It is probable that the periodontal membrane at the beginning of the experiment was at *d*. We see bone deposited on traction to an extent that the periodontal membrane (*e*) is reduced nearly to normalcy, while the contact on the side of pressure is not yet liquidated. Compare that width on the side of traction with that in Fig. 1.

Fig. 5 shows the result of the same kind of experiment with the same duration of three weeks. The continuous cementum deposition goes on all around the apex. Only on close examination can we find at *a*, and more pronounced at *b*, necrotic tissue in connection with the cementum surface. Manifold experience tells us that these are the last remainders of contacts between tooth and bone which have been liquidated by rear resorption. At *b* there are numerous osteoclasts still at work, to clear the area of debris. At the side of traction we see an apposition line (*c*), which informs us where the new deposition of bone on traction started. The whole strip of bone inside that line was deposited at the time of the experiment. The periodontal membrane (*d*) on the side of traction is here wider than in Fig. 4 and narrower than in Fig. 1. Here the contact on the side of pressure was already liquidated and the tooth started apparently to move again.

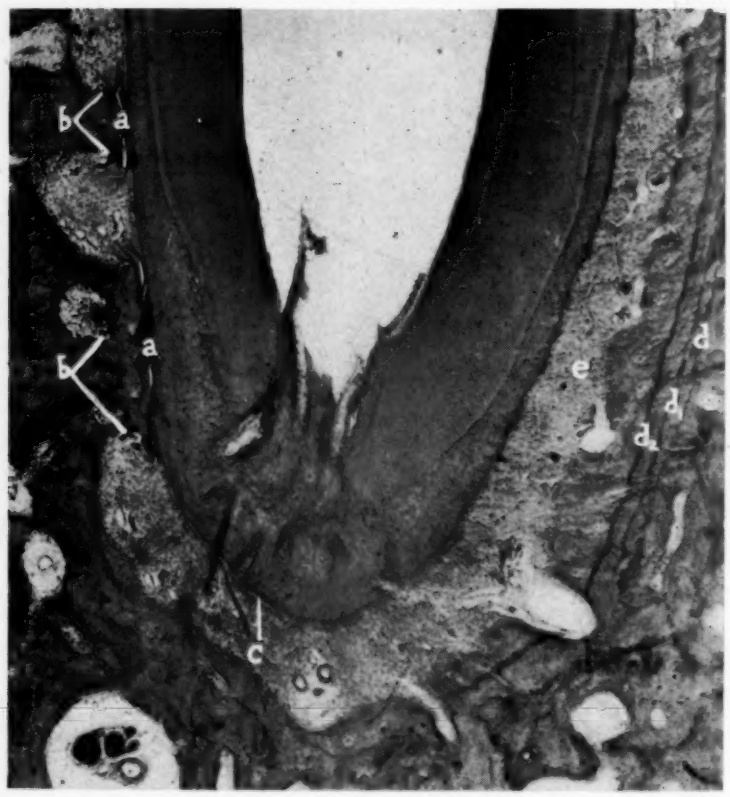


Fig. 4.—Tooth moved as in Fig. 1. *a*, At contact of tooth with bone, periodontal membrane destroyed; *b*, osteoclasts removing bone by rear resorption; *c*, continuous cementum deposition; *d*, d_1, d_2, apposition lines of bone deposited on traction; *e*, periodontal membrane on side of traction, reduced to normal by bone deposition.

We could not find a single instance of damage on the side of traction in dogs, nor could it be found in any experiment on monkeys.* Examining a great amount of human tooth material with surrounding tissues in the microscope, we found several times pieces of cementum torn out of their connection

*Breitner, C.: Ztschr. f. Stomatol. 30: 1185, 1932.

with dentine. That is a damage from traction, which probably is not duplicated in orthodontics. We cannot make a definite statement as to how such things happen. It indicates that the connection of the periodontal fibers with bone and cementum is stronger than the strength of the cementum in itself or the connection of the cementum with the dentine. It also indicates that the fibers themselves are strong enough and do not tear. Our useless pressing and grinding between meals seem to be more harmful than the strongest orthodontic forces. At that occasion it should be remembered that the rest position of the mandible between the meals should be such that the opposite teeth are out of contact. The lately reported damage on the side of traction in orthodontic experiments seems to have resulted from involuntary rotating components that may develop especially in the use of ligatures.

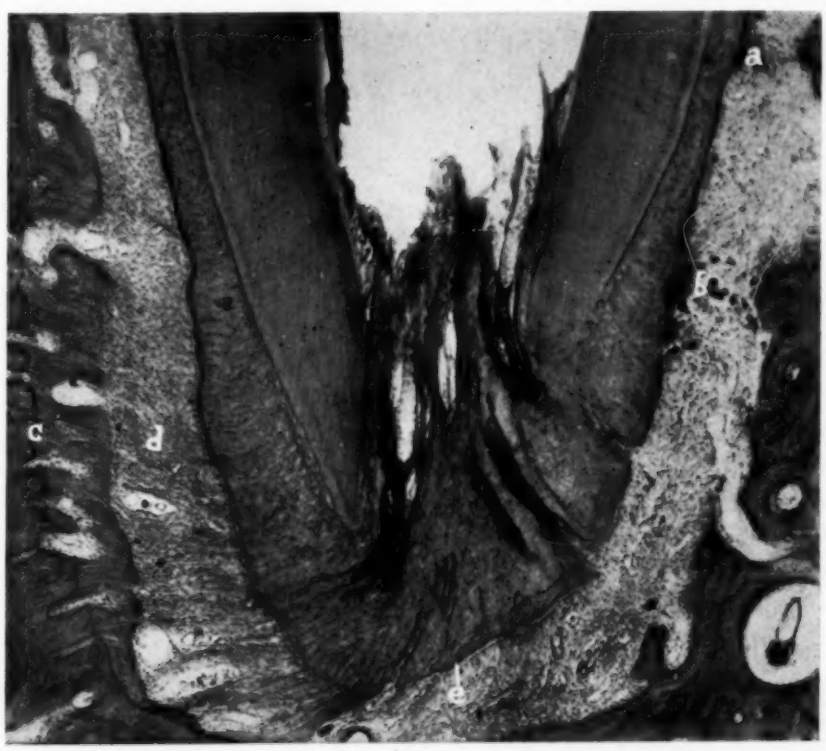


Fig. 5.—Experiment as in Fig. 4. *a*, Necrotic deposit in cementum; *b*, the same with numerous osteoclasts, last remainders of liquidated bone contact; *c*, apposition line of bone on traction; *d*, slightly widened periodontal membrane.

ANKYLOSIS IN ORTHODONTICS

It may seem common sense to believe that physiologic movement counteracts ankylosis, while immobility of the tooth favors it. Ankylosis is entirely a biologic problem and not a functional one. Impacted teeth, without pathology, may remain without ankylosis permanently, while overloaded teeth, as in orthodontics, may develop it. Inquiring among orthodontists, one finds quite a number of observations which point to ankylosis. First molars, which have been used for anchorage, either for an outer or an inner arch, were found to

be quite often affected. However, other teeth may show ankylosis also. In the molars it shows up mostly later, when "shortening" of the tooth is observed. That indicates that the neighboring teeth continued their normal continuous active eruption while the affected tooth could not change its position in the jaw because of being ankylosed to it. If it happens in teeth under orthodontic movement, the tooth stops to answer orthodontic intentions one day, no matter what kind of appliance is used.

In our experiments in dogs we found quite a number of ankyloses in connection with tooth movement. Fig. 6 shows such an ankylosis after an experimental duration of six months and twelve days. Resorption into the dentine (*a*) preceded the ankylosis with the bone (*b*). While the ankylosis was still small, a tear developed in the bone (*c*), severing the tooth with a piece of bone from the jaw. Apparently the animal hit the teeth with excessive vigor. But the tear was overcome by additional bone formation (*d*) and a definite ankylosis was established.

At *e*, resorption of the dentine is still progressing, indicated by the presence of numerous osteoclasts. Once the coat of uncalcified cementum is not protecting the root surface anymore and resorption has proceeded into the dentine, nobody can tell where the resorption will stop and deposition of bone will start. It is a misunderstanding to assume that the presence or absence of osteocytes in the bone lacunae determines how far resorption of the bone goes. Dentine has no cells at all and resorption stops somewhere and deposition starts. In dentine with living pulps there are at least extensions of cells, the dentinal fibrils; but in pulpless teeth we have not even that, and it behaves exactly the same way. If it did not do so, the entire tooth would be resorbed in every case of a pulpless tooth. Root canal work would be out of question. It is not the absence of cells from the lacunae which determines if a hard tissue is to be resorbed or not, but the quality of the matrix. We know that uncalcified matrix is resistant to resorption and that is what makes the presence of an uncalcified cementum coat on the root surface so important.

We do often see bone resorbed that contains osteocytes. Occasionally, one can observe a lacuna opened by resorption and the osteocyte seems to become again a connective tissue cell. Dead bone, like a sequestrum, is characterized by empty lacunae. Such bone cannot be resorbed for two reasons. The surrounding connective is so damaged that it cannot perform resorption. The sequestrum, on the other hand, is so poisoned that it could not be digested even by healthy tissue. Experience with graftings* shows also that the absence of osteocytes does not condemn a bone to being resorbed.

The problem of bone resorption seems to consist of three possibilities. At first, bone pieces are exchanged without visible histologic reason provided that healthy connective tissue is in contact with it. The same applies to all hard tissues, including enamel. Even here we see resorption going on to some extent, leaving part of the enamel unresorbed and starting to deposit bone on

*Stein, G.: Ztschr. f. Stomatol. 26: 284, 1928.

the surface of the partly resorbed enamel, dentine, or bone. Functional reasons can be entirely excluded from that kind of process of resorption as well as from the process of new formation of bone. Here we can only guess biologic reasons, at least, for the resorption. Some quality of the hard tissue, of which details are not known, until now invited the surrounding connective tissue to eliminate it until quality is reached which does not call for elimination. Maybe

Fig. 6.—Experiment as in Fig. 1. Duration six months, twelve days. *a*, Resorption of dentine; *b*, bone; *c*, necrosis by rupture of bone; *d*, repaired ankylosis; *e*, progressive dentine resorption.

that quality invites deposition. The second possibility consists of connective tissue reaction upon compression. It trys to gain back, whenever possible, the old amount of occupied space; therefore, it is reclaimed from the bone since the tooth is protected by a layer of uncalcified cementum. This possibility applies to orthodontics. The third possibility is resorption due to lack of function. Neither of these three possibilities is connected with the presence or absence of osteocytes.

Trying to find out the biologic conditions which favor the development of ankylosis, we can state that the contact of the resorbed dentine with bone seems to be responsible in many cases. As soon as the slightest repair of the resorption develops, as we see it in Fig. 7, the possibility of ankylosis seems to be eliminated. The developing of a thin cementum layer (*a*) makes the fixing of periodontal fibers (*b*) possible, and the normal relationship between tooth (*c*) and bone (*d*) is re-established. The illustration is from an experiment on a dog. Additional information will be furnished by Fig. 8. The tooth was kept

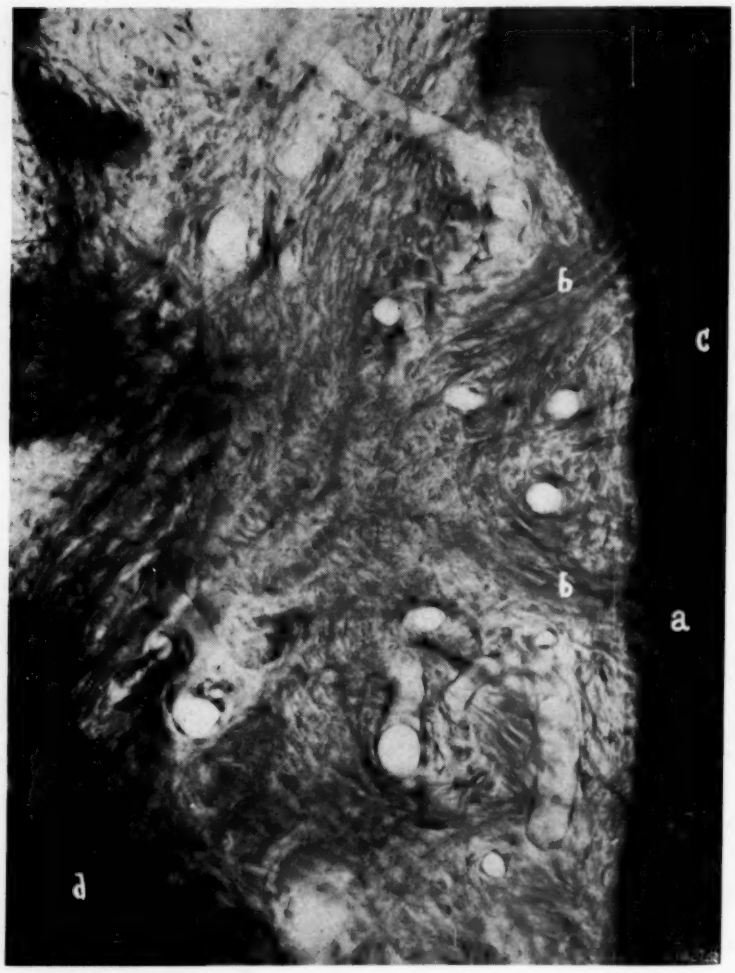


Fig. 7.

Fig. 8.

Fig. 7.—After resorption of tooth (*c*), thin cementum layer (*a*) has repaired it, fixing periodontal fibers (*b*).

Fig. 8.—Repaired tooth resorption at alveolar margin. *a*, Repairing cementum; *b*, bone.

under experiment five months and twenty-two days. The cemented crowns were removed and the animal lived another five months and twenty-six days. The extended tooth resorption appears repaired by a thin cementum strip (*a*). The opposite bone (*b*) is in good relationship to the newly established tooth

surface. An x-ray examination may indicate "resorption," but, in fact, everything is ideal.

Fig. 9 shows the bifurcation of an upper molar of a monkey, from experiments of Breitner. Cast crowns were cemented for twenty-seven days and an expanding arch inserted. The surface of the tooth is resorbed (*a*). Bone (*b*) is growing toward the resorbed surface. In adjoining sections the ankylosis of the tooth with the bone is already established.

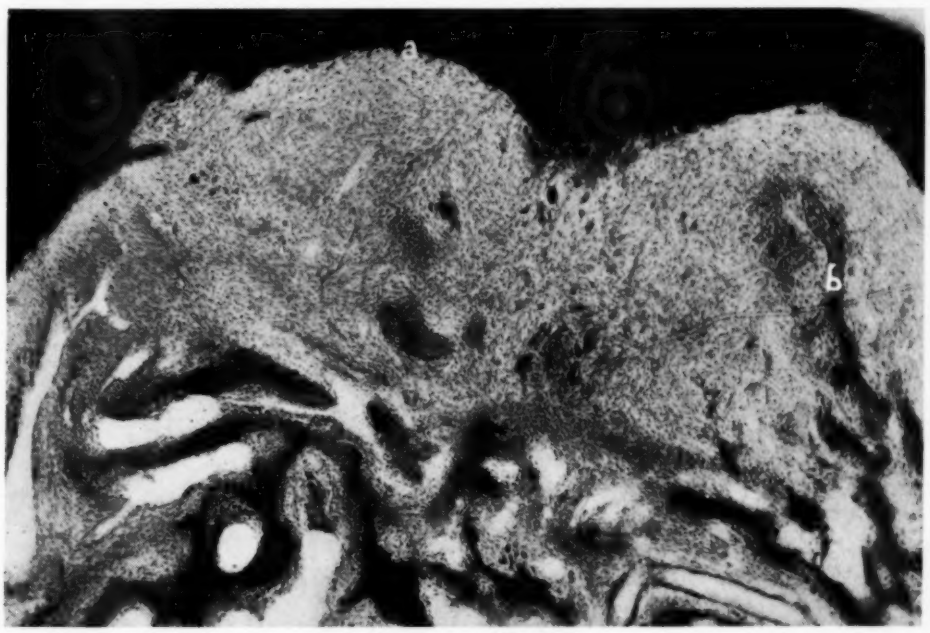


Fig. 9.—Bifurcation of a monkey's molar (experiment by Breitner). *a*, Extensive resorption of tooth surface; *b*, bone trabecula growing toward tooth.

Fig. 10 shows an ankylosis of a dog's tooth at the alveolar margin. The animal was under experiment (cast crowns) for five months and ten days. Some signs of tears (*a*) point to a disconnection of the ankylosis in the first time of its development. Now a solid ankylosis is present. The tooth surface was resorbed into the dentine in most places. At *b*, the ankylosis developed at a place of nonresorbed, calcified cementum. It is probable that ankylosis developed secondarily here. Until now an ankylosis of a noncalcified cementum strip could not be observed. At *c*, there is a deeper resorption into the dentine, partly lined with a bone layer.

In view of the considerable discomfort that confronts the orthodontist when an ankylosis develops, it might be advisable to try to analyze that condition. Maybe some useful information for the orthodontist will result. It seems that the presence of a continuously newly deposited coat of uncalcified cementum saves the root surface from becoming resorbed or fused with the opposite bone. Experiments* showed that by damaging the root surface by application of heat in the root canal, we get ankylosis, mostly without resorption. *Feldman,*

*Gottlieb, B., and Orban, B.: Ztschr. f. Stomatol. 28: 1208, 1930.

Moskau was the first to show experimentally produced ankylosis. He achieved that by putting cotton soaked with formalin into root canals of young dogs. The formalin acted on the root surface and the periodontium, through the root wall. He got ankylosis with and without tooth resorption. The main condition for development of ankylosis seems to be a damaged root surface, which is not covered by a noncalcified cementum layer. If the damage is severe (chemical or thermal), the adjacent connective tissue is necrotized.

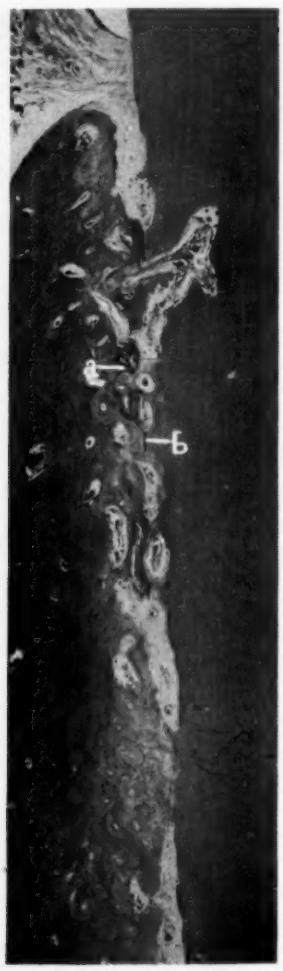


Fig. 10.—Ankylosis of dog's tooth at alveolar margin. *a*, Necrosis due to rupture at beginning of ankylosis; *b*, ankylosis with intact cementum surface; *c*, deep resorption into dentine.

Such damage is liquidated when the necrotized periodontal membrane is replaced by healthy connective tissue. In orthodontics we may get similar conditions. If a resorbed area of dentine is brought into contact with the bone, before new cementum is deposited, that may represent a predisposition to ankylosis. If, however, after resorption the relationship between tooth and bone remains stable, until a new cementum coating is formed (Figs. 7 and 8), ankylosis may be prevented.

First molars used for anchorage are sometimes reported ankylosed. A tooth used for anchorage is moved nearly as often as any other tooth because of reactionary forces involved in moving that tooth with its help. That way it may happen that a repeated movement of the anchor tooth brings a resorbed area into contact with the bone before it is repaired. Cemented crowns act like teeth used for anchorage. The tooth is hit again and again, often without being given a chance for repair of eventual resorption. The same applies to the constant use of ligatures.

Orthodontists using mass movement report that they do not observe ankylosis. Accordingly, it may be advisable to analyze mass movement. If you tie several teeth together and move them en masse, the group can only be moved until one tooth of the group comes into contact with its opposite bone. When that happens, the other teeth of the group are still some distance from their alveolar bone. No new movement can be achieved until the contacted bone is liquidated by rear resorption. It is common sense that contact is greater in bodily movement than in tipping. The time that is required in liquidating a contact in a bodily movement is more than enough, in order to perform the indicated bone resorption in the other teeth of the group, corresponding to the received stimulus. Let us take the instance when the group is moved by intermaxillary ligatures. They will not produce any further movement until the contacted bone is removed.

Then the next movement sets in. A contact which was liquidated by rear resorption has, right after the tooth is freed, a broader periodontal membrane than normal, while the other teeth of the group, having been fixed, have a narrower periodontal membrane. Thus, it is nearly certain that the second movement will bring some other tooth of the group into contact with bone. That position will keep the first affected tooth some distance from the opposite bone. That relationship will remain until the contact of the second tooth of the group is liquidated by rear resorption. That rest period gives the first affected tooth plenty of time for restoration of an eventually damaged or resorbed area on the tooth surface. A third movement may again hit the first tooth. It cannot do any more harm, the first damage having been repaired. This is the explanation offered by orthodontists using mass movement, for not encountering ankylosis.

APICES OF ORTHODONTICALLY MOVED TEETH MAY PERFORATE THE BONE

In an experiment on a dog lasting three months and seven days (Fig. 11), the oblique articulation plane runs more horizontally. The apex showed a considerable contact with the bone (*a*), which was partly freed by rear resorption (*b*). The lateral component of the articulating plane pressed the apex also in an outward direction. The original mandibular bone is perforated. The osteophytic bone (*d*), deposited as compensation on the outside, appears separated from the old bone. It happened during the histologic technique. That formation of compensating osteophytic bone is very irregular and we cannot even offer a guess for explanation of this irregularity. If the apex

is moved a considerable distance and the formation of osteophytic bone on the outer side developed poorly, the apex may finally be situated under the mucous membrane. If such happens in an orthodontic case, nobody should be blamed and nobody should feel alarmed. Additional bone formation at a later time of rest is possible. But even if that does not occur, the tooth can remain in good function. It is, however, indicated to stop additional movement.

Pulp tests should reveal if the pulp is damaged. The pulp tester should be an instrument often used by the orthodontist. We can imagine that an axial movement like that shown in Fig. 11 destroys the entrance of the pulp at the apex. Bringing down an impacted tooth, the pulp may be torn by traction.

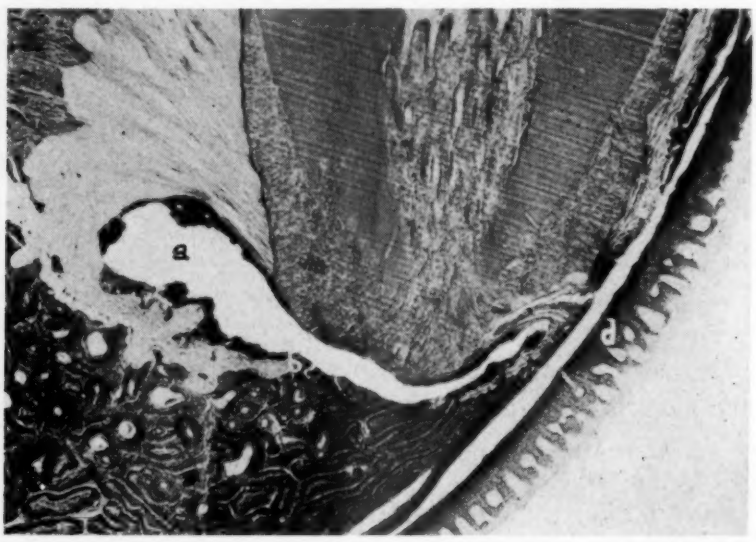
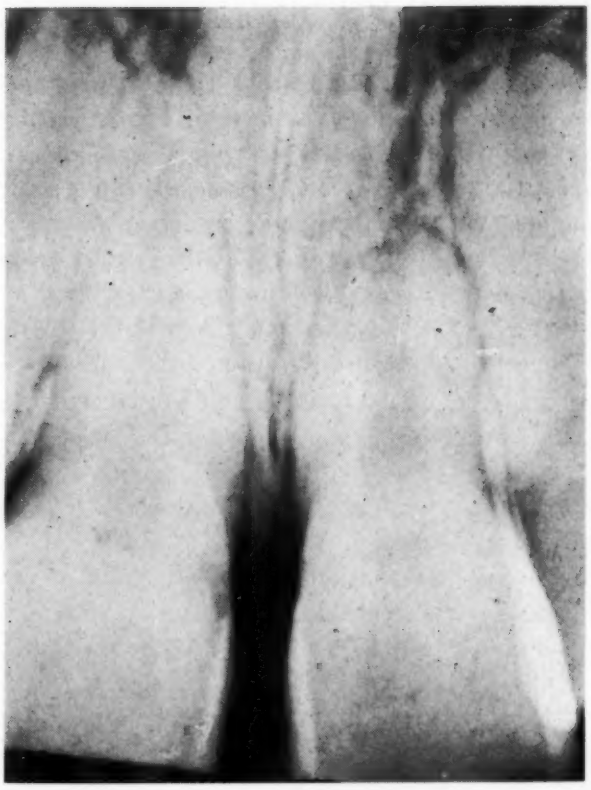


Fig. 11.—Dog's tooth. The necrotized periodontal membrane. *a*, Partly freed by rear resorption; *b*, original mandibular bone perforated at *c*; *d*, compensating osteophytic bone.

Orthodontics is based on the supposition that, by compressing the periodontal membrane between tooth and bone, it resorbs the bone, leaving the tooth surface intact. In fact, we often find that true. Most of the reproduced illustrations here show it. We have already mentioned that apparently the coat of uncalcified cementum protects the root surface from being resorbed. There are indications that the continuous deposition of new cementum layers is determined by some internal secretion activity. Its disturbance causes "pyorrhea." It was proposed recently to change the name into "*cemetopathia.*" If such a layer of uncalcified cementum protects the root surface properly, the intact apex will succeed in perforating the bone and reaching the submucous layer without any resorption of the tooth. Such an incidence appears to be the ideal normal. If, however, the root surface is not protected from resorption, the perforating force will be blunted by tooth resorption.

ORTHODONTICS AND PYORRHEA

Some orthodontists are inclined to blame orthodontic procedures for ensuing periodontal disturbances. Dogs are prone to get pyorrhea. Our experi-



Figs. 12, 13, and 14.—A 12-year-old girl with apical resorption of one central incisor and the the two upper lateral incisors, before start of orthodontic treatment.

ments did not furnish the slightest indication that "*traumatic occlusion*" can produce pyorrhea. The observed cases of pyorrhea in orthodontically treated patients may be explained in a different way. There are quite a number of periodontal disturbances during puberty, especially in girls. If such a person is, or was, in orthodontic treatment, it may easily be blamed, without justification. Apart from that possibility, the up-to-date dentist is not ready to accept the statement that orthodontics may produce pyorrhea like a miracle. He wants the pathogenesis explained, otherwise the statement does not appear to him to be justified. The clinical reports in this direction are not convincing.

It is common knowledge that the continuous cementum deposition is the hinge on which all functional problems depend. Periodontal disease is the main functional problem. Faulty orthodontics may cause ankylosis, but not pyorrhea. No tooth is damaged by overloading as long as the protective coat of continuous cementum deposition is intact. As soon as that does not function properly, we get tooth resorption and downgrowth of epithelium along the cementum. Orthodontic experience has shown that not orthodontic treatment by itself produces ill effects, but that protracted treatment over a great number of years is responsible. The longer the treatment, the more probable becomes an overlapping with an eventual systemic disturbance. The shorter an orthodontic treatment, the smaller is the chance that systemic irregularities will interfere. Not only pyorrheic disturbances are involved, but also root resorptions. Both are founded on common ground.

The following case may illustrate this:*

A girl of 12 years was supposed to start orthodontic treatment. X-rays were made before starting. One upper central incisor and the two lateral incisors show resorption of the apex in the way it is described for orthodontic cases (Figs. 12, 13, and 14). Had the orthodontic treatment started before development of these resorptions, or had they developed during the orthodontic treatment, nobody would have doubted that the orthodontic treatment was the cause. That is a rather rare case.

It was reported that comparatively fewer resorptions are encountered in orthodontic work in young children than in older ones continuing the orthodontic work for a long period.† Every orthodontist knows that the resorption of the roots is mostly affected by long treatment. To treat older children means to continue treatment into puberty. That observation shows that the orthodontic treatment may help tooth resorption, which is facilitated by a peculiar inner secretory situation.

CONTINUOUS ACTIVE TOOTH ERUPTION AND TOOTH IMPACTION

The tendency to continuous active eruption is known as existing definitely. The teeth have the tendency to move in the direction of the enamel-covered crown. That is demonstrated in the rare cases where the tooth germ is inverted and an incisor, for instance, points with the enamel to the nose. Such a tooth erupts into the nose and not with the apex of the root into the mouth.

*Courtesy Dr. E. B. Arnold, Houston, Texas.
†Rudolph, C. E.: J. Dent. Research 19: 367, 1940.

Trying to understand that fact, we have to realize that the tissue tone is directly connected with the root surface while the enamel of the crown is separated from the connective tissue by a layer of epithelium. That apparently prevents the tissue tone from acting on this part of the tooth as it does on the root. Fig. 15 shows the epithelium blanket separating the enamel from the surrounding connective tissue. Besides that, the epithelium layer protects the surface of the enamel from any interference of the connective tissue, either depositing cementum or performing resorption. In the Herbivora the developmental plan calls for cementum deposition. The continuity of the epithelium becomes interrupted and the connective tissue deposits cementum on the enamel.

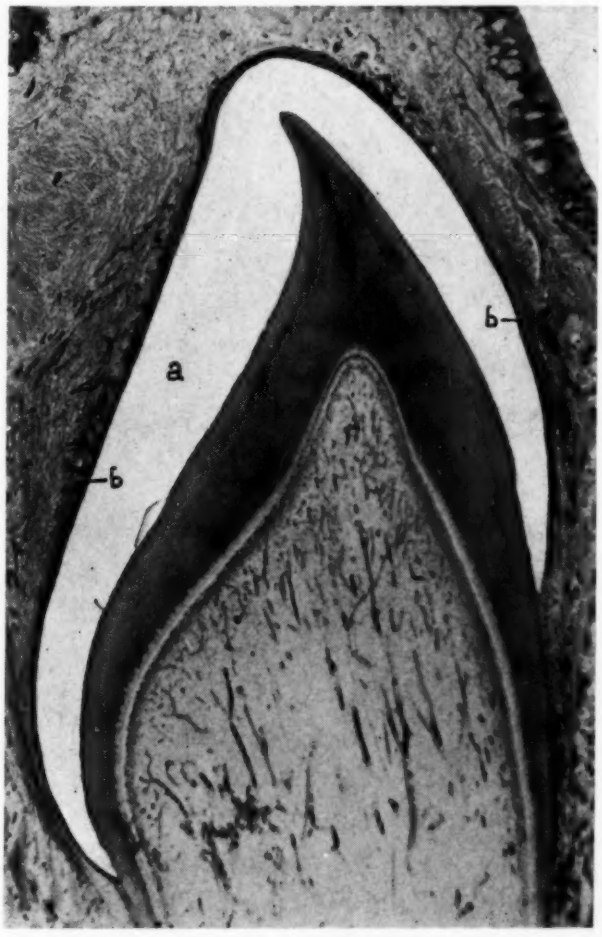


Fig. 15.—Tooth before eruption. *a*, Mature enamel dissolved by acid; *b*, epithelium blanket between enamel and connective tissue.

Fig. 16 shows the development of the right upper cuspid nearing completion in the skull of a child 10 years old. Only a small part of the apex is to be formed. The tip of the crown is far from its destination, in the upper as well as in the lower jaw; however, we know that such teeth move out and reach their place. The pressure of the tissue tone is able to move the tooth and to compress the connective tissue between germ and deciduous tooth. That way it stimulates resorption of the deciduous tooth. The enamel of the permanent tooth is safe from resorption, being protected by the mentioned epithelial blanket.

As soon as the crown has erupted, the situation becomes even more favorable toward continuous active eruption. The crown is quite free until it comes into occlusion. Having no obstacle it moves fast into that position. Reaching the occlusion means being stopped grossly, but the tendency exists. The overbite of the front teeth is apparently due to the fact that these teeth have no antagonists and are more or less free to continue their movement. That seems to be the background of the increased curve of Spee in Class II cases and the increasing of the overbite in people who are chewing gum. The premolars and molars are constantly kept under pressure and the front teeth are relieved for continuous eruption. The tissue tone decreases constantly with age. As a rule, the impacted tooth stops moving as time goes on. The obstacle is the soft tissue overlying the crown which compensates for the tissue tone. Only seldom do we see a front tooth moved the root having contact with an impacted cuspid.

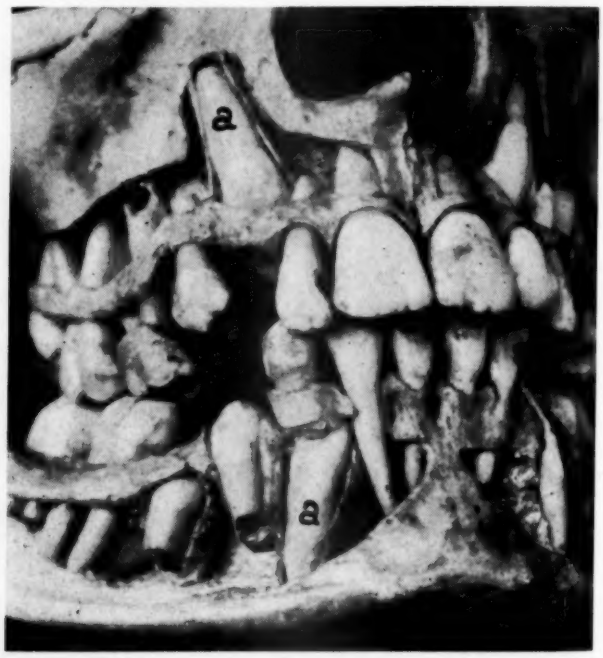


Fig. 16.—Ten years of age. Small apical part of cuspid (*a*) still missing. Distance of crown from occlusion by far greater.

It is known* that the movement of the tooth in the sense of eruption is governed by the pituitary gland and that, in turn, has close relation to the ovaries. That connection is definitely established, though the details are still obscure.

The following figures will illustrate the meaning of active continuous eruption: Fig. 17 shows the persistent second deciduous molar of a person around 25 years of age. The occlusal surface is far behind the neighboring teeth. We know that at the beginning, when the first molar had erupted, its occlusal plane was on the level of the second deciduous molar. This persistent deciduous

*Schour, I., and Brodie, A. G.: J. Dent. Research 14: 166, 1934.

tooth was apparently ankylosed and was left behind by the continuously erupting neighboring teeth. Fig. 18 shows a seemingly shortened lateral of a person over 40 years of age.* The contact with a neighboring impacted cuspid fixed the tooth in its position somewhere in the past, while the neighboring teeth continued their eruption.

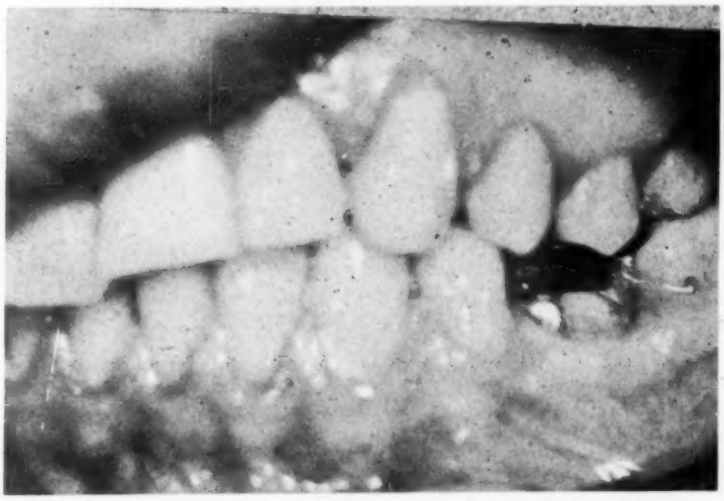


Fig. 17.—Persistent second deciduous molar, overholed by the neighboring teeth.

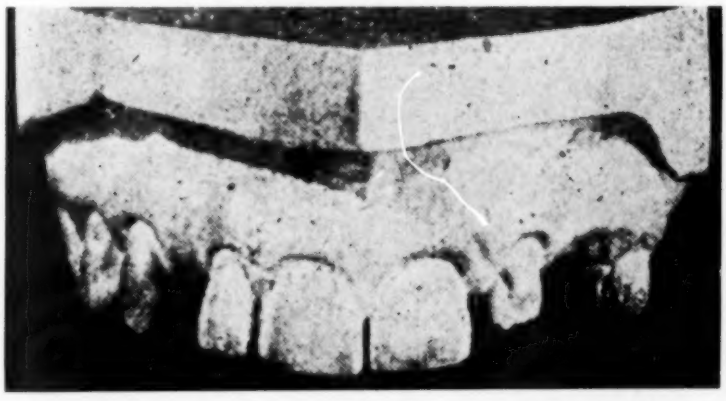


Fig. 18.—Lateral fixed by contact with neighboring impacted cuspid is overholed by other front teeth.

It was mentioned that the occlusion is the counteracting factor to continuous eruption. Everybody knows that after extraction of teeth in one jaw, the opposite teeth continue their eruption with great speed, the obstacle having been removed. The result is the same if the obstacle is overlying tissue, covering the crown or an articulating tooth. The tone pressure on the root surface is not compensated and that results in increased rate of eruption. Fig. 19 shows two premolars leaving the neighboring teeth far behind, because they have been deprived of their articulating teeth.

*Gottlieb, B.: Ztschr. F. Stomatol. 22: 501, 1924.

Fig. 19.—Two premolars without antagonists erupt rapidly.

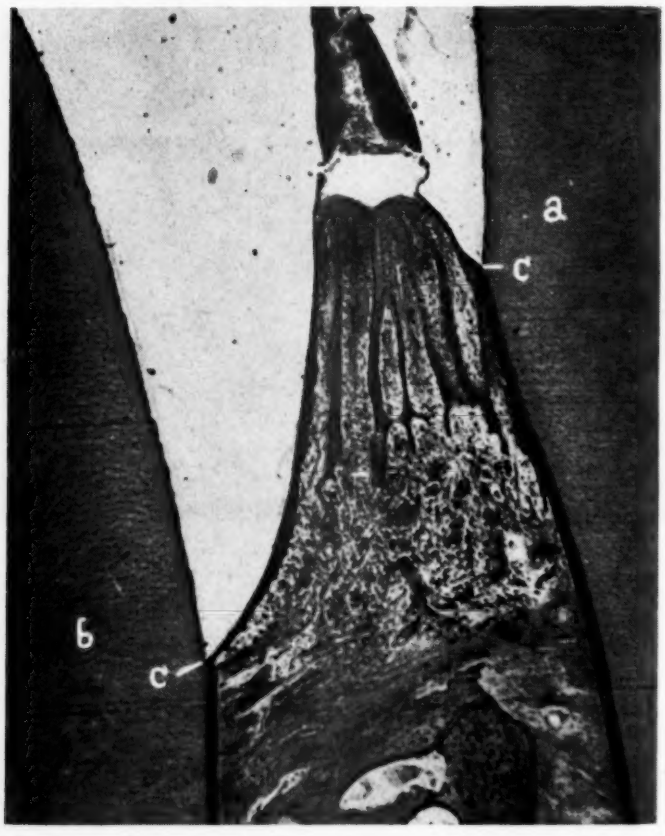


Fig. 20.—The first molar (*a*) erupted further than the second one (*b*). *c*, Cementoenamel junction.

Fig. 20 shows the papilla between the first and second molar of a 19-year-old person. Clinically the second molar has long been erupted. But there is a considerable difference in the level of the cementoenamel junction of the two molars. The first molar has six years more of continuous eruption than the second molar. The wearing down of the occlusal surface provides place for the continuous eruption. The younger the person, the greater the tissue tone, which means the greater the tendency toward active eruption.

Having clarified the biologic background of the continuous eruption, the way we have to proceed in impactions appears common sense. Many clinicians did it that way a long time ago, with great success. We have to remove the obstacle,* thus shifting the balance of forces entirely in favor of the tissue tone acting on the root surface. *We have to transform the impacted tooth into an erupted one without antagonist.* We know that the movement in the direction of the freed surface is reliable. Only horizontally impacted teeth, being fixed by the neighbor, have no chance. But all oblique impactions of cuspids as well as third molars are prone to move out, once we have freed them past the greatest circumference of the crown, and have taken care that the opening remains that way.

Research is supposed to reduce the number of miracles which are encountered in practice and to put them on a basis of a common sense explanation, with the help of the results of research. Maybe this paper has succeeded in that direction somewhat. If it has, the relationship between practice and research may rise from the present low level.

*Gottlieb, B.: Am. J. Orthodontics and Oral Surg. 31: 42, 1945.

A DISCUSSION OF TREATMENT BASED PRIMARILY ON LABIOLINGUAL THERAPY

RUSSELL E. IRISH, B.S., M.A., D.D.S., PITTSBURGH, PA.

YOU have asked me to meet with you and have suggested that I prepare and read a paper expressing some of my views associated with treatment. Those views are to be based primarily on labiolingual therapy. The views which I shall express are not necessarily applicable only to the labiolingual technique. It does follow, as I see it, that they are an integral part of it, and, as you know, I use it exclusively.

From my point of view and from my profound interest in orthodontia, I see this method of treatment as more nearly approaching the ideal or Utopian method than any other method in current-day use. I further believe that it is more closely related and more in keeping with biologic concepts, and that it permits our accomplishing a justifiable result from treatment more safely and with less disturbance of any nature than any known method of treatment where mechanical intervention is necessary. I believe it second to none.

I have arranged an outline for the purpose of giving continuity and greater clarity to what I will say. The outline is, of course, by arrangement here. Yet I am sure it is fitting and applicable in the scheme of everyday orthodontics. Please remember that allotted time and allied subjects limit my considerations. Bear in mind that many of the things I will mention you already know; perhaps others will be new to you.

If you find in my expressions one grain of enlightenment, which you will have sifted from the chaff, I shall feel amply repaid and happy in having spent time in composing my paper.

Let us think of orthodontics as being divided into five headings, as follows:

1. Scientific.
2. Biologic.
3. Mechanical.
4. Practical.
5. Maxims of Treatment.

1. *Scientific Orthodontics.*—Having a knowledge of the science of orthodontics and evincing such knowledge in a systematic manner.

I do not believe that any treatment we follow can be an integral part of successful end results unless the course of treatment we follow is based on scientific foundation and procedure. Therefore, it becomes evident that one of the first requisites is that of applying our knowledge in a precise, systematic manner. We must diagnose, classify, and analyze, and then determine what we

Read at the Twenty-Second Annual Meeting of the Southern Society of Orthodontists, Jan. 27, 1946, at Charlotte, N. C.

are going to do with a given case. We must select, outline, construct, place, and direct by adjustment the appliance we are to use. This must be done in absolute keeping with the scientific data on hand.

Let me digress for a moment to say that I wish it were possible for all present to have had the very fine privilege of learning the art and science of flying an aeroplane. I do not know of anything more akin to scientific musts, for the whole of it is rhythmic coordination and procedure, balance and counterbalance. You really learn, absorb, and apply the science, or you miss going on. The point I wish to make by comparison is the necessity of scientific knowledge and the importance and value of using it. Nor can we expect to get anywhere in orthodontics without it.

In labiolingual therapy, bands and appliances are made according to scientific principles. Their insertion and fixation into the mouth is not done in a casual manner, but by definite established procedure and principles, which you all know or should know, for they are set forth in the text, *Labio-Lingual Technic*. When the appliances are made to function, this is done in keeping with established procedure based on scientific findings which are factual. We do not say, "*Perhaps* this is correct procedure."

You know that, barring structural failure, appliance failure is due not to the appliance itself, but primarily to the operator. We must determine the biologic, mechanical, and practical relation of appliances, and further, their application, from the moment of their insertion into the mouth. We must also know the essentials of correct anchorage and maintain it. We must know auxiliary spring type, auxiliary spring relation to the appliance, to the teeth, and in some instances to the soft tissue, so that when treatment is in progress it is practical, dependable, and accurate. Treatment must cause, to the greatest possible degree, normal physiologic change in producing the desired end result.

You and I have a practical as well as a book knowledge of other techniques, and we know that they stand on scientific foundations. Those techniques without such foundations die quickly.

We must be sincere, for we have been privileged to serve in a great field. If we are not sincere, we are without conscience, for we are causing humanity to suffer. Believe me, I have no controversy with regard to the technique and therapy you follow, but I do say, for your sake and for the sake of humanity, make your decision as to which you prefer, and follow it exclusively, without deviation. Do not switch about or you will flounder and eventually you will pyramid failures. In my opinion, humble though it is, and for its worth, I say that it takes full time, thought, and many years to understand and apply skillfully any technique. Of course, less time and thought are required if you do not care what you do or how you do it. I have made it a practice never to be without counsel.

Speed is not primarily a factor in orthodontics, but it is in racing. You can, however (scientifically), with labial and lingual appliances, accomplish a desired result as rapidly and accurately as with any appliances. Do everything you can to understand and adhere to scientific concepts, and your course will be easier, your results more gratifying.

2. *Biologic Orthodontics.*—Having a knowledge of the science of life and organisms.

Orthodontists with years of experience, as well as those just beginning practice, know the importance and necessity of having a thorough working knowledge of tissue and tissue changes which take place in the oral cavity during treatment. To be able to understand thoroughly the differentials relative to normal and abnormal changes is essential. With such knowledge we can look beyond tooth movement, which after all is not the difficult problem of treatment. For, to move teeth fast or slowly, all we have to do is push or pull with varying degrees of force, which determines the speed of movement.

It is true that a tooth does have a pulp, nerve, and blood supply. In main body, though, teeth are composed of hard compact tissue. A tooth, as defined, is a "specialized dermal structure situated in the oral cavity, consisting of calcified osseous tissue called dentine." By deduction we can understand why the teeth are less likely to be a part of sudden structural change. The tissues around the teeth are highly vascular, sensitive, and responsive to change.

What we must keep in mind is the fact that during tooth movement by mechanotherapy there is a very, very pronounced change taking place in the surrounding structures, a breaking down (not destruction) and building up of minute cellular structure.

Change is constant in body structures, but it is by natural biologic growth change processes. However, the instant we cause additional changes by mechanical intervention, you can see the picture, so to speak, in the engineering department within the cells proper. They become more complex, more proliferative, in that they have greater responsibilities in maintaining their balance. They work to regenerate that which is being lost.

Any change brought about by appliances must, if properly done, balance as much as possible with metabolic processes. Certainly in my opinion (and I am not alone in thinking so), these changes can be brought about more accurately by the appliances of which we are talking than by those which are rigidly attached to teeth for the purpose of bringing about change of tooth position and change of surrounding tissue.

Another factor of which we must be mindful is that the various tissues have various and variable degrees of response to change and regeneration—some more, some less, and some less quickly, than others. We have already said that change is constant within the oral cavity. When we bring about added changes, we should, therefore, mark our whole procedure with design in keeping with biologic processes and treat each case as a law unto itself. There are, of course, established laws to be followed, but there are also variables to account for. It follows that we must, as indications warrant, deviate and make allowances and changes to cope with such factors. If we know what we are doing, this is practical and permissible, just as long as we do not disregard basic scientific principles.

One thought, as expressed by Dr. Clint Howard, which I like to keep in mind, is to consider each case as an "individual normal." Do not try to make it fit another frame; keep it where it belongs.

What I will say now, I have stated many times before; in fact, I have it always in mind and, believe me, we cannot overlook it: action and reaction are equal and opposite. Nothing we do and nothing which takes place is without change. It is also true that energy is constant, changing only its form. We should remember these facts because we must reckon with them; if we do not, trouble ensues. If we follow accepted principles and approach our problems in an analytical manner, the picture becomes clearer and we are more likely to accomplish what we are working for.

Mershon spoke true words when he said, "You can push teeth to where you think they belong—Nature will move them to where they will best adapt themselves to the rest of the organism." That expression, gentlemen, is certainly in keeping with biologic principles.

We read in our literature, from time to time, many and varied opinions, all of which may be important. However, regardless of their grandeur, we should accept them for their worth by analysis based on scientific and biologic deduction. Certainly, they should not be harmful if they make us think, thus keeping us from becoming mentally static.

Some say in part, and we might partially agree, that the business of placing teeth on the ridge is the last word in essentials of treatment. This is a worthy principle, to be sure, if we do not allow ourselves to run wild and forget everything else related; and if, in bringing to a reality of treatment, we do not try to place square pegs in round holes. In my opinion, it is just as impractical to believe that such procedure is absolute and final as it is to disregard it completely. There is no utopia, as yet, in orthodontics. Therefore, we must consider that some teeth might be more in keeping with functioning and balance without relapse if they are off the ridge. Or, in other words, we think of them as individual normals. Anyway, by last analysis, where and what the teeth are, determines the absolute answer to ridge procedure. What I prefer to do, then, is to accept such splendid data with the proviso of variables and limitations and as being usable where and when I think suitable.

Another consideration of which I am mindful is the extraction of teeth in orthodontic treatment. I firmly believe this is right, proper, and in keeping with biologic principles—only, however, if such modus operandi is not done in a fad-like manner; such acceptance by any orthodontist is pure fallacy. Let us be sure, by analysis to the best of our ability, that teeth should be extracted for compensating treatment before we have them removed. And believe me, I am sure that there are definite times when they should be removed, as well as indicating reasons for so doing. I have great regard and respect for theories and principles, but I prefer to study them first before accepting them in my realm of treatment.

I am wondering now just what we may have forthcoming in the line of theories and treatment since man has split the atom beyond his fondest dreams, and since the Atomic Age is here. Many new discoveries in medical science will be forthcoming, and I am sure some of them will be applicable to orthodontic treatment. Aside from the biologic considerations, we should have better materials as a result, because new and finer metals will be produced.

So much for biologic considerations and the importance thereof.

3. *Mechanical Orthodontics.*—Having a knowledge of the qualitative relations of force and matter and evincing their practical application.

With known principles in mind, we should not forget to associate theoretical principles as well. I have in mind theoretical resistance to the known resistance and reaction of matter and force. If you desire to work in the direction of mechanical fineness, if you wish to be an Oliver, so to speak, you must persevere, paying particular attention to trifles, for they lean toward perfection. If you ever expect to become skilled or to master any technique, you must persevere.

It is the privilege of a person writing a paper to digress, to reiterate occasionally. This I now do, with the purpose in mind of giving a thought to beginners. I am not a scientist, but I am scientific-minded. Those of us present who are older in years and in experience—or should I say wisdom—which comes of both, will say, I am sure, "Do not be pseudo scientific. Be thorough. Either aim to be a scientist in true light or leave science to those qualified."

Read Hellman wherever and whenever you can; he has something worth while. Do not go "roamin' in the gloamin'." Such is all right for love, but science knows no love.

Again I say, do not let the grass grow under your feet—not at all until such time as it grows *over* your feet due to reasons over which you have no control. You may wonder what this has to do with labiolingual therapy. I say that it has much to do with labiolingual therapy, to be sure, if you will but catch the point of significance.

In order to have appliances function properly, one must consider their purpose, proper construction, application, placing, operation, relation, and components. Components of appliances are bands, tubes, auxiliary attachments, adjustments, force, pressure, action, and reaction. It would be difficult to differentiate their importance; then again, time does not permit our doing so now. I do wish to speak about frequency of adjustment, amount of adjustment, and the amount of force and pressure due to adjustments. One can always be sure in making adjustments where force is added, by keeping in mind that too little is better than too much.

The problem of adjustments must be associated with the type of auxiliary spring in use, its length, shape, size, relation, etc., the teeth being moved, and the tissues involved in given areas.

There is no need to dwell further on the mechanical musts of treatment, for they are clearly detailed in the textbook, *Labio-Lingual Technic*. I refer you to Chapters IX, XII, XIII, XVII, XVIII, and page 404—"Auxiliary Spring Force and Auxiliary Spring Attachments." To those less familiar with the labiolingual technique and therapy, I suggest that they review the book. I further suggest that they read Oliver's article in the August, 1945, issue of the AMERICAN JOURNAL OF ORTHODONTICS AND ORAL SURGERY.

4. *Practical Orthodontics.*—Putting into practice or action that which is usable and valuable.

One of the first things to do is to diagnose, classify, and study the clinical findings of the case to be treated. After which, all plans should be made to determine the most accurate manner of procedure in treatment. The treatment undertaken should be stamped with the mark of simplicity, in my opinion. After twenty-five years of practice and study, I have come to believe that complicated appliances complicate treatment, and that both are in keeping with trouble. Long, long ago, I remember hearing Martin Dewey, whom I consider my greatest teacher, say to me, "Russell, simplicity marks surety, and you will profit by remembering this as you go on." I have profited and, believe me, I will not forget it.

By analysis it is true that if we make and place within the mouth complicated appliances, they become less practical; particularly from the point of control, manipulation, and with regard to oral structures. It cannot be otherwise, because appliances that are less in substance must be less in apposition. This, it appears to me, is another indication of why labial and lingual appliances are practical in treatment—they are not complicated.

I simply cannot bring myself to use appliances with which it is necessary to band many or all of the teeth to be moved. I have reasons, and many of them, but I did not come here to discuss or argue my views with regard to other appliances, even though they are many and varied. Perhaps such a discussion can be held at some other time.

Practical treatment, all things considered, certainly must be that treatment which, when applied, produces the desired result, is in keeping with growth processes, tissue change, and balance, and permits physical and mental comfort.

What makes the labiolingual technique and therapy so superior to others is its simplicity and accuracy and the practical manner in which it is applied.

One outstanding feature is the use of auxiliary springs, which, as used today, are very, very accurate and dependable. They have a very definite relation to the appliance, to the teeth being moved by them, and in some instances to the soft tissue. They are no more intermittent in action than any attachment or appliance in use today. How could they be unless we cause them to be by our own doing? They are constant within themselves (unless distorted or broken) and function until they reach a point of passiveness, as determined by our adjustment of them. Therefore, if we keep them in constant motion, they cannot be intermittent in action any more than any other appliance. To my knowledge, there is not a mechanical appliance in use today that does not need some kind of shaping or adjusting.

What makes auxiliary spring use doubly practical is that we can know definitely by measurement the amount of force and pressure being applied. The dynamics and statics of them are most controllable, and, further, there is freedom of yield to any imbalance, as opposed to rigidity due to multiplicity of fixation of some appliances. There are less restraint, less trauma, more freedom, more perfect balance in all respects.

There is one thing certain in the use of labial and lingual appliances, and that is, meeting the problem of any negative complications which may arise

wherein it becomes advisable briefly to allow Nature to deal her own cards. The appliances can be quickly and conveniently removed without causing further irritation. Every orthodontist has had to face such problems; and believe me, some of the appliances in use represent a fine mess when they have to be removed due to such conditions. And some of them present a quite painful, irritating few minutes to the patient. I am speaking of the removal of a great number of gadgets. When lingual or labial appliances are removed, the only things remaining are the molar bands, except in a very few cases when one or two other bands may be in use.

When it becomes time to replace them, this can be done quickly and conveniently with no disturbance whatsoever. Things go on as before their removal. No lengthy readjustments are necessary. There are no small bends here, little curves there, where reconformation has to take place at the expense of sudden tissue change due to the afore-mentioned. Neither is there any rigidity to cope with. This certainly is an advantage and a factor in control.

I could go on but I am not privileged to do so by the time allotted me. So much then for remarks about practical orthodontics.

5. *Maxims of Labiolingual Therapy.*—The maxims I shall mention are axiomatic with me. They were taken from notes compiled in my office over a period of time during working hours. While I want them to have continuity within themselves, they are not in sequence one with the other, for, as I say, the notations were made from time to time. For convenience I have lettered them, so that if you wish to refer to them, you can remember them as lettered.

A. *Moving Premolars and Cuspids Before and During Their Eruption.*—Let us assume, for example, that a premolar is unerupted (but will shortly be exposed) and in linguoversion (upper or lower), to the degree that it will be entirely to the lingual when erupted and will not move to normal position by natural force.

What I do, and very, very successfully with no disturbance whatsoever, is start movement immediately so that by the time the crown is exposed the tooth is in its correct axial position, and will move vertically into the line of occlusion and correctly occlude with opposing teeth. This early treatment has been most gratifying to me and has simplified problems considerably. When you stop to think of it, this is little different in many respects from moving an impacted tooth to position. And further, it is certainly in keeping with growth processes. I am so convinced at this date that such treatment is correct, that no one could change my mind.

I have not at any time had to retain the teeth one instant. While it is true that they are being moved to position, they are in a sense growing to position because of such early movement. And I think the reason for not having to retain them is because once they are brought to position in the line of occlusion, they grow the remainder of the way uninterrupted in all respects.

Moving them is quite simple, and, as you recall, I mentioned earlier that auxiliary springs could and should engage soft tissue without irritation.

If you are going to move a premolar in linguoversion, you place an auxiliary spring (I usually use a coiled or wrapped spring at its point of attachment), 0.020 or 0.018, shape it, and relate it correctly to the appliance, immediately beneath the appliance. Then shape it to engage the lingual surface of the premolar by bending the free end of the spring to form an obtuse, acute, or right angle as required. The end of the spring is then finished to a point. When the spring is complete, it is then bent so that when in position the point will puncture the tissue and engage the lingual surface of the premolar in the region of the lingual cusp. Bending the spring prior to seating is for the purpose of getting the pressure necessary to move the tooth. Let me caution you that the pressure should be very mild. It need not be very much because resistance is less and response rapid.

There is no set shape or type of auxiliary spring which is to be used. Requirements and a modicum of good judgment and common sense determine the kind to be used. The same procedure is followed in moving cuspids in linguoversion.

Another example is that of moving a maxillary cuspid erupting in mesiolabioversion, the crown of which has not quite reached a point of exposure. This is done to place the tooth in correct axial plane for vertical growth prior to the setting of growth processes to advanced malposition.

The labial appliance is placed and marked to accommodate a looped, curved auxiliary spring. The appliance is marked at a point slightly posterior to the distal surface of the cuspid. It is then removed from the mouth and a 0.022 wire is soldered perpendicularly to the appliance and shaped so that, when in position in the mouth, it will extend upward and curve to extend forward and downward. Thus it will engage the cuspid on its mesial surface at a point slightly below the point of greatest convexity. This would place it toward the tip of the cusp. The auxiliary spring is back of the appliance and it is shaped to contact the soft tissue at but one point.

When the auxiliary spring is properly shaped and related to contact as mentioned, the end is balled (by applying heat). The spring is bent to give necessary pressure when in position in the mouth. When the spring contacts the tooth, it will have engaged and penetrated the tissue, and correction will be under way. If this is properly done, you need have no fear of sad results. Nor are you liable to have any misplacement of the auxiliary spring. If you do, place an auxiliary attachment as a guard.

Regardless of what you may think, this is the most simple, accurate, proper, and gratifying procedure you will incorporate as part of your labiolingual therapy if you will but try it in a scientific manner. There is nothing unusual about such treatment, nor is it radical in any sense. By analysis and deduction you know that the teeth are in the process of growing and elevating. The crown is formed; therefore, change is nil there. The tissues immediately above and around the upper part of the crown are traumatized due to the pressure brought about by crown elevation, which is caused by the developing root of the tooth. The tissue's being traumatized means less sensitivity. Immediately beneath

the outer tissue and covering the crown as a protecting medium is Nasmyth's membrane, which, as the tooth erupts, stretches, yields, and finally absorbs, leaving the crown exposed. The epithelial tissue is also highly desensitized due to traumatization. It also absorbs. Therefore, what we are correcting by mechanical means, we keep in balance. What transpires as we do it, Nature keeps in balance. The beautiful part is the fact that Nature, by her own musts, is getting things out of our way as she had planned to do long before we entered the picture. So, you see, everything is in our favor if we will but take care of our own details. As to any injury of the periodontal membrane, that also is impossible because we are far, far from engaging it.

B. *Auxiliary Springs and Gingival Tissue.*—It is better that auxiliary springs do not engage the gingival tissue.

For the past two years I have kept accurate check with regard to any disturbances, and I am convinced that if the spring and appliance are correctly made in the beginning, they retain their proper relation. If they should become slightly or greatly disrelated, yet retain their general over-all original relation, any irritation from them is minor.

I have further observed that the few auxiliary springs which did engage the tissue did not cause any disturbance of a serious nature. Upon adjustment, the appliance was replaced and treatment continued without consequence. Recovery was swift with no permanent injury or remaining scars. Medication was not necessary.

C. *Auxiliary Springs.*—Bear in mind when using auxiliary springs that they can be so adjusted as to cause single or multiple movement on one or more teeth. For example, a perpendicular right-angle auxiliary spring can be so adjusted as to cause a tooth to rotate and move lingually at the same time. We think of such a spring as being placed on a protruded maxillary central or lateral incisor. The adjustment of the auxiliary spring by the operator determines whether the movement of the tooth shall be one or twofold.

The same kind of tooth movement may be had by using a horizontal anterior-recurved auxiliary spring. Such a spring contacts the linguogingival surfaces of upper or lower anterior teeth. The spring is adjusted to move the teeth forward. At the same time, by opening the recurve, the teeth are rotated as they move forward. In using this type of spring, remember not to make the adjustment too extensive, because pressure quickly doubles itself due to recurve length, which is less than main spring body up to the point of recurve.

I further caution you to keep in mind the areas of surrounding tissue engaged and the density of these. Adjustment or opening the recurve should not exceed ½ to 1 millimeter. If you have a means of getting a reading of pressure, do so, and do not have it exceed ⅛ to ¼ ounce. I suggest that you refer to the theoretical outline of tooth movement, page 137, *Labio-Lingual Technic.*

Keep in mind when making adjustments of all types of auxiliary springs that shape, wire dimension, and spring length must be accounted for. Another

thought which is helpful is that it is not necessary to adjust an auxiliary spring each time a patient comes in. If treatment is progressing properly, remove the appliance, clean and replace it without adjustment. In other words, allow it to continue working and check it on the next appointment. As long as work is going on smoothly, do not disturb it by changing. The more we leave alone during treatment, when things are going properly, the better will be the end result.

As an average, adjustments are better left over three- or four-week appointments. Even longer periods would be far from incorrect or harmful. Let the spring work until it is just about passive before readjustment. Locate the spring in keeping with the movement desired and in accordance with other requisites which you already know.

Up to the present time, the wire used for most auxiliary springs has been 0.020. During the past two years I have in some instances been using 0.018 and 0.016, finding this most advantageous, particularly where a short spring and a very low pressure are desired. If they are properly shaped and related, they seldom become distorted.

D. *Placing Bands and Appliances.*—In placing bands and appliances, I follow an established procedure, which I think to be the most accurate of any I have thus far used.

First I place the bands on the molar teeth and seat them properly. Then I place both lingual and labial appliances in position in the mouth. This is really a trial insertion. The appliance, if correctly made, should seat accurately by *finger pressure alone.* If there are any slight variances, I make corrections. Occasionally it may be necessary to change buccal tube relation slightly. Rarely, if ever, is it necessary to change lingual tube position. If all relates as it should, I remove the bands and appliances and proceed with final fixation.

First I clean and dry the bands with alcohol and place wax in the lingual tubes. I then take a pellet of cotton and with fine pumice thoroughly clean the tooth and spray the mouth. While cement is being mixed, I block off the area with gauze, and thoroughly dry the tooth with a pellet of cotton saturated with alcohol.

When the cement is mixed, the band is filled with cement, and just before placing it, I paint the tooth with cement and then seat the band. When the cement has hardened, the excess is removed and the appliances are ready for placing.

You may wonder why I am mentioning all this when it appears as daily routine. I do so because I am convinced that many orthodontists just place bands. Herein lies one of the musts of therapy, for if bands are not correctly placed, anchorage, appliance relation, tooth protection, and treatment fail. Just a trifle, we might say, but "Trifles make perfection and perfection is no trifle." Corum says, "Get it first, but first, get it right."

Now another vital consideration, the placing of appliances. All things being equal, the lingual appliance is placed; it should move to position (and this is important) by *finger pressure alone, without adjustment.* Otherwise, it is in-

correct. It is not often necessary to readjust the appliance; if at all, the adjustment is minor and should be made before reseating the appliance. The final seating—and I stress this point—can and should be done without pliers, by finger pressure alone. The same applies to the labial appliance. Never, under any circumstances, place any appliance where and when it is disrelated.

Another change which I have adopted in treatment and which I believe correct by clinical evidence is that of allowing the appliances to remain passive for the first appointment, which up to now has been a two-week interval, to note reactions. In some cases I now make immediate very mild adjustments and give a three-week appointment. So far, such procedure has been satisfactory, and why should it not be if things are correct?

E. *Condition of the Mouth.*—Upon having a patient referred to me, I first check oral conditions for any and all work, operative and cleaning, to be done. I also insist on x-rays and I stress the importance of cooperation on the part of the parent and the patient. If need be, I instruct them on brushing the teeth properly. I further give them written instructions, which I find helpful. If they do not cooperate, I do not want them as patients. These are simple, yet vital, aspects of therapy.

F. *Buccal and Lingual Extensions.*—The more I use these, the more I see the convenience and correctness of their use. I will not dwell at length about them since they are described in the textbook referred to.

I do wish to state briefly that buccal and lingual extensions make possible the shifting upward or downward of labial appliances very conveniently in the mouth without having to remove bands to change tube position. Further, they keep buccal and lingual tubes entirely free of buccal and lingual, gingival tissue. They also permit greater buccal (outward) movement of premolars and cuspids without remaking and adjusting appliances. Any adjustment of buccal tubes having extensions should be made with the appliance in position to prevent tube closure and to determine the appliance relation desired. After the adjustment is made, remove the appliance and check for correct stress relation.

G. *More Uses for the Labial Appliance.*—In the past two years, I have come to find that with added attachments, the labial appliance can be put to many more uses. In fact, in some instances it has more uses than the lingual appliance. Some of these are rotation, upward and downward movement, anterior and posterior movement of one or more teeth, etc.

H. *Making Appliances.*—Make appliances with the thought in mind of the case they will treat, add to them that which is necessary, and nothing more. Make them as they are to function. Do not modify or change them by incorporating other appliances or techniques. You can mix theories, but it is not good to mix techniques, for many cross purposes become evident.

I. *Tipped Molars.*—First let me say that I mention tipped molars not because such happenings are numerous in cases I am treating, for such is not the case. But if we are honest, we must admit that we have all had such cases, as has

every orthodontist. We shall not concern ourselves here as to reasons, happenings, etc. The point I wish to make has to do with what to do about it and how much we need concern ourselves with it.

By close observance I have found that such happenings are self-correcting if we check them and if tipping is in keeping with normal tissue change, from force, and not against directional placement and movement of the periodontal membrane and surrounding tissues. At the conclusion of treatment I have watched tipped molars right themselves; hence my conclusions by analysis. Of course, cusp interdigitation, stress relation, and other factors are a part of correction, but, as stated, I merely wished to mention a point of conclusion.

J. *Negatives in Treatment.*—I have found that the best thing to do when too many negatives are manifest during treatment is to remove all appliances for a period. It is reasonable to believe that the first law of treatment in dealing with too many negatives is that of giving Nature her own way for a while and, while so doing, making one's analysis.

K. *Moving Adjacent Teeth After Extraction.*—This can be done conveniently within one or two weeks, and at the same time safely, if the moving force is very mild. There is an advantage in early movement in that the response of cellular change is already taking place and a highly prolific state exists, due to extraction. I refer, of course, to moving an adjacent tooth into the area of extraction.

To move the tooth or teeth, place the auxiliary spring so that it extends incisally, or occlusally if on a posterior tooth, and so that it makes contact above the contact point of the teeth. Adjust the spring so that it has a downward (toward the gingival) pressure. As the spring moves downward, the tooth is moved and the spring seats gingivally, moving past the contact point and the height of contour. As the spring moves gingivally, pressure decreases in accordance with the adjustment made. When, by a series of adjustments, the spring has moved to a gingival position, reshape it to extend horizontally toward the buccal and adjust it to continue moving the tooth, cutting away the excess length. When first placed, the spring will incline the tooth as it moves. In other words, it will cause the crown to move more than the root. As it seats gingivally, the root movement becomes greater. So you see why, along with other things stated, it is possible and practical to move teeth under such conditions.

If a horizontal looped auxiliary spring can be used from the start (that is, where there is space, and a spring does not have to be extended incisally) the same can be done if the pressure is very, very mild, because of more root movement taking place immediately.

L. *Incisal and Occlusal Extension of Auxiliary Springs.*—For the past year and a half, I have been extending springs in this manner in many cases, particularly over anterior teeth when moving them mesially or distally. I do this rather than extend them horizontally through the interproximal space at the

gingival. The type of spring is a looped spring attached to the lingual appliance—never to the labial. They are extended as explained in section *K*.

I find this method most practical where several springs are necessary at one time. You may be surprised when I tell you that they are rarely distorted. Further, I find primary movement and tissue change more uniform—I extend the springs labially and bend them gingivally, balling the end to prevent lip irritation. They contact snugly the labial surfaces of the teeth at their contact point. As the springs move gingivally, I re-shape them as necessary so that eventually they assume a horizontal plane labiolingually or buccolingually at the gingival.

The teeth, of course, are gradually and uniformly being moved from the first placement of the springs. I believe that placing springs in this manner at the start is much better in some cases than extending them interproximally because of the possibility of distortion and too much force. In any event, you will find it a very practical procedure.

M. *Vertical Growth.*—When treating to get vertical growth in what are termed closed-bite or overbite cases, when following labiolingual therapy, I firmly believe that the correct time to treat them is when the premolars and cuspids are erupting, not before; and certainly not after they have erupted and reached a static point of growth.

By placing an occlusal guide plane at this time, the forces of occlusion will be free to work in the direction of the established plane. At the same time, individual or singular tooth movement can be instigated by mechanical means. Most of the change occurs by natural growth processes.

N. *Removal of Hyperplastic Tissue.*—Removal of such tissue has been most helpful in my practice. In fact, in some cases I have been astounded with the favorable changes which have taken place after its removal. For example, teeth move more uniformly, growth processes respond more rapidly, and teeth retain their correct position and relation when moved.

I first saw Oliver remove tissue from partially erupted cuspids that were slow in responding to treatment. This impressed me, and since then we have checked, double-checked, and corresponded, and, as a result, we are convinced of the importance of removing such tissue. Beyond question of a doubt, some relapse after treatment is due to not having removed the tissue. This is particularly true of anterior teeth.

Without going into detail, let me say that when this tissue reflects to the lingual or labial surfaces of anterior teeth, it should be removed. It is particularly necessary when teeth are being moved from a protrusive to normal position. The tissue seems cartilaginous, leathery, and tough; it seems not to yield to change; it acts as would a rubber band under pressure and release from pressure. The tissue is very easily removed by first injecting novocain and then excising the tissue with Bard-Parker lancets.

This operation should not be done freely, carelessly, or without positive indications. Do not think of it as a panacea of treatment. A word of caution:

it is better in the beginning to remove too little than too much tissue. Never engage or involve the periodontal membrane.

After removal there will remain a subgingival space, and you need not be concerned with discomfort or irritation.

The area must be properly sterilized and medicated before beginning the operation. It is understood that all instruments must be sterile. To check any hemorrhage, I use Monsel's solution, and place the appliances immediately. Then I instruct the patient or parent about postoperative care.

O. *Rotating Teeth.*—I believe that if teeth (particularly anterior teeth) in torsiversion are rotated as they grow vertically, they are less liable to revert to malposition, because they are growing rather than being moved to position before growth processes have set. Posterior teeth in torsiversion less frequently completely revert to malposition because of function, cusp interdigitation, and more substantial fixation.

P. *Growth Processes.*—Cases not under immediate treatment (watch cases), I divide into two groups for convenience: those having arrested development or biologic imbalance and retarded growth; or those of a nonbiologic group, or acquired malocclusion. By so doing, I believe I can, and do, more correctly analyze changes prior to treatment.

Q. *Early Treatment.*—I believe in early treatment (not in all cases) of malocclusions because I think it better to break up irregularities rather than to allow them to become fixed and set to dysfunction. Early periodic phase treatment is definitely indicated in many cases. Labiolingual therapy is most fitting to treatment where deciduous teeth are present.

R. *A Thought for Your Consideration.*—Have you noticed that, when moved to proper relation with regard to occlusion, teeth more quickly become firm in position? Their correlated structures lean to permanency of position. Also, have you noticed that during movement where processes are counterbalancing, teeth remain more firmly fixed, as compared to the reverse where balance is off? This gives the thought that teeth are more likely to remain where placed if we maintain counterbalance, along with other things, during treatment.

It may be possible that it represents a means of indicating that retainers are contraindicated where balance is proper. Sometimes retainers hold teeth where they just do not belong. It is well to remember here our quotation from Mershon.

S. *Auxiliary Spring Guards.*—I have found that by attaching a short length of 0.020 wire to the lingual appliance and extending it perpendicularly toward the gingival immediately behind the auxiliary spring where it is in contact with anterior teeth, the spring remains undisturbed. Horizontal springs extending forward are sometimes used. I found, however, that displacement of auxiliary springs, when it happened, was more often to the lingual. The change as suggested nullifies displacement.

T. *Comfort.*—If a child having orthodontic treatment cannot eat, sleep, and play as without appliances, or if he is having pain, there is something radically wrong, and corrections should be made. When treatment is as it should be, he is not thinking of it at all.

U. *Jiggling.*—I was much amused in reading a recent article to note the manner in which the writer spoke of auxiliary spring use. He said that auxiliary springs caused tooth jiggling. This is amusing, to be sure, but indicative of stupidity. Certainly, anyway, it shows his scope of learning, which in my opinion is long since static.

I double-checked the word "jiggling" in Webster's dictionary and I am satisfied that all is right with me, for Webster says at the start, "to move with light, quick jerks." That we do not do, and I am not interested in *jerks.*

Again I read of one hundred models on exhibit, which the writer I mention must have seen, because he said that some of us would start treatment where they left off. "Off" is a good word, for it means "remote or removed from" and I am inclined to think that his analysis as well as his ability is removed from the first, second, and third dimensional space of reason.

The point I wish to make, gentlemen, is not to allow yourselves to be misled by such idiotic statements. Respect all techniques and principles based on sound logic, for each and every one of them have yet to reach a utopia. Being pseudoscientific is valueless.

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612 FULTON BUILDING.

Editorial

Albin Josef Oppenheim
1875-1945

ALBIN OPPENHEIM passed away in Los Angeles, California, Nov. 20, 1945. He was born in Brno, Moravia, Austria-Hungary, Jan. 8, 1875.

Orthodontists and many others will mourn the loss of this man who made some of the important contributions to the scientific department of the specialty. It was in New London, Connecticut, in 1911, when a teacher in the Angle School of Orthodontia, that he first presented his epoch-making contribution on the subject of "Tissue Changes Incident to Tooth Movement."

The report of his painstaking research presented at that time was the result of extensive work done upon monkeys, and this made possible certain deductions pertaining to the movement of teeth, which added much to the general advancement of orthodontics. This work was published in the *American Orthodontist,* Volume 3, Numbers 2 and 3, by the Alumni Society of the Angle School of Orthodontia, and since that time has been widely quoted in orthodontic literature, both in textbooks and in manuscripts in scientific periodicals.

As a result of the research, Dr. Oppenheim was the first to point out the necessity for slow, gentle, intermittent pressure to be applied in the movement of teeth, and he submitted scientific proof to support that observation. His work turned orthodontic attention away from the type of orthodontics being practiced at that time, because it revealed that such methods of moving teeth were entirely too violent to be physiologic in result.

Thirty-three years subsequent to that research, Dr. Oppenheim made his latest contribution to the same subject, in which he pointed out the striking new evidence that the bone does not respond to strong mechanical forces in such a way as to be of advantage in orthodontic treatment, and that orthodontists were still using entirely too much mechanical energy in the movement of teeth.

The new research was completed in Los Angeles, in connection with the College of Dentistry of the University of Southern California, and was published in two parts in the 1944 volume of the AMERICAN JOURNAL OF ORTHODONTICS AND ORAL SURGERY. The author's last experiments were also made on monkeys and checked with work previously done on dog and human teeth. The work revealed destruction of bone cells as a result of orthodontic stress when used with too much energy.

He supplemented his findings with suggestions for their application in treatment. For instance, he advocated the more general use of the headcap and stated the principles for its use only during the night.

Dr. Oppenheim's background of education consisted of high school in Brno, in 1893, a degree of M.D. at Ferdinands University in Prague, in 1899. He took the following internships at the Vienna General Hospital: Psychiatry,

Nose and Throat, Surgery, Dermatology, Syphilis, and Pediatrics. He received his degree in Dentistry at the Berlin Dental Policlinic in 1904.

He engaged in private practice of dentistry, including orthodontics, in Vienna and also gave part of his time as head of the department for broken and injured jaws in the Army Hospital from 1914 to 1918, and a short time later as head of the Orthodontic Department of the Dental Institute of Vienna.

He and Dr. J. Gruenberg of Berlin translated the Angle textbook, *Malocclusion of the Teeth,* into German in 1908. The second edition in 1913 included Dr. Oppenheim's original research work.

Albin Josef Oppenheim

In 1911 he was invited to become a teacher in the Angle School of Orthodontia in New London, Connecticut.

In 1926 he was summoned to the staff of teachers of the Angle School of Orthodontia, in Pasadena, California, where he lectured for some weeks on theoretical and practical Orthodontics.

At the beginning of March, 1938, Professor Oppenheim received an invitation from the College of Dentistry, University of Southern California, to join their staff in graduate orthodontics.

In 1939 he became Research Professor at the College of Dentistry, University of Southern California.

In 1944 he became an American citizen.

He received the following honors:

1912: Honorary member "Angle College of Orthodontia."

1926: The high distinction "mare ofiter" steaua Romanied, "civil" for scientific merit from the Roumanian Government.

1932: Honorary member "Zahnaerztliche Gesellschaft in Wien" (Dental Society in Vienna).

1938: Honorary member "Svenska Tandlakare—Sallkapet" (Swedish Dental Society).

1941: Honorary member "Pacific Coast Society of Orthodontists."

1942: Honorary member "Mexican Orthodontic Society."

1945: Honorary member "New York Society of Orthodontists."

Dr. Oppenheim's scientific publications include:

1908:

"Verschienene Methoden der Herstellung von Goldinlays": Oesterr.-ungar. Vrtljschr. f. Zahnh., January, Heft 1.

Die Verwendung diatorischer Zaehne zu Kronen und Brueckenarbeiten. Verwertung der Gussmethode": Oesterr.-ungar. Vrtljschr. f. Zahnh., July, Heft 3.

1911:

"Der 'Working Retainer' in der Therapie der Kl. II": Oesterr.-ungar. Vrtljschr. f. Zahnh., April, Heft 2.

"Die Veraenderung der Gewebe, insbesondere des Knochens bei der Verschiebung der Zaehne": Oesterr.-ungar. Vrtljschr. f. Zahnh., October, Heft 8.

1911-1912:

"Tissue Changes, Particularly of the Bone, Incident to Tooth Movement": translation, The American Orthodontist, October, 1911, January, 1912.

1913:

"Kritsche Bemerkungen zu dem Artikel Hauptmayer's 'Ueber die anatomischen Veraenderungen,'" etc.: Deutsche Monatschr. f. Zahnh.

"Die Veraenderungen der Gewebe waehrend der 'Retention'": Oesterr.-ungar. Vrtljschr. f. Zahnh., July, Heft 3.

1919:

"Extraktionsverstuemmelungen im Milch- und bleibendem Gebiss": Oesterr-ungar. Vrtljschr. f. Zahnh., October, Heft 4.

1920:

"Extraktionsverstuemmelungen im Milch- und bleibendem Gebiss"; Erwiderung an Dr. Greve: Oesterr.-ungar. Vrtljschr. f. Zahnh., January, Heft 1.

1922:

"Histologische Befunde beim Zahnwechsel": Ztschr. f. Stomat., October, Heft 10.

1925:

"Muskelübungstherapie nach Rogers": Ztschr. f. Stomat., July, Heft 7.

1925, 1926, 1928:

"Orthodontische Therapie," reviews of current orthodontic literature with Dr. J. Gruenberg, coauthor: Fortschr. f. Zahnh.

1927:

"Die Prognathie vom anthropologischen und orthodontischen Gesichtspunkt": Ztschr. f. Stomat., June, Heft 6.

1928:

"Prognathism From the Anthropological and Orthodontic Viewpoints"; translation, Part II, Negro Skulls: Dental Cosmos, November, December, Vol. 70.

1929:

"Ueber Wurzelresorptionen bei orthodontischen Massnahmen": Ztschr. f. Stomatol., July, Heft 7.

1930:

"Die Prognathie vom anthropologischen und orthodontischen Gesichtspunkt"; II Teil, Rassenschaedel: Ztschr. f. Stomatol., April, Heft 4.

"Prognathism From the Anthropological and Orthodontic Viewpoint"; translation, Part II, Negro Skulls: Dental Cosmos, June, July, Vol. 72.

"Bone Changes During Tooth Movement": Int. J. Orthodontia, May, Vol. 16.

1933:

"Verbuergt die Verwendung kontinuierlich wirkender Kraft den optimalsten biologischen und klinischen Erfolg?": Ztschr. f. Stomatol., June, 31. Jahrg. Heft 11.

"Die Krise in der Orthodontie"; I und II Teil: Ztschr. f. Stomatol., Heft 7, 8, 14, 15, and 22.

"Raddrizza mento dei denti del giudzio inclusidisposti obliquamente": Ortognatodonzia.

1933, 1934, 1935:

"The Crisis in Orthodontia"; Translation, Int. J. Orthodontia, December, 1933, Vol. 19; January-August, and October-December, 1934; January-August, 1935.

1934:

"A Practical Suggestion": Ibid., September, Vol. 20.

1935, 1936:

"Biologic Orthodontic Therapy and Reality"; translation: Angle Orthodontist, July, 1935, Vol. 5, No. 3; October, Vol. 5, No. 4; January, 1936, Vol. 6, No. 1; April, Vol. 6, No. 2; July, Vol. 6, No. 3.

1937:

"Einzelne bei jeder orthodontischen Behandlung zu beruecksichtigende Detailfragen und Momente": Prakt. Zahn., V. Jahrg. Heft 1.

"Der Luekenschluss": Ztschr. f. Stomatol., Heft 11.

1940:

"Artificial Elongation of Teeth": AM. J. ORTHODONTICS AND ORAL SURG., October, Vol. 26, No. 10.

1942:

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Die Orthodontie und ihre Beziehungen zur konservierende Zahnheilkunde: Berlin, 1912, Hermann Meusser.

Die Krise in der Orthodontie: Vienna, 1933, Urban & Schwarzenberg.

Biologisch orthodontische Therapie und Wirklichkeit: Vienna, 1936, Urban & Schwarzenberg.

There are but few outside the orthodontic profession who are aware of the wide scientific contributions this man with a medical degree made to orthodontic advance. That is why a record is here made of his important contributions.

There is not an orthodontist in the world who is not familiar with the name of Oppenheim, and his loss will be regarded as a serious loss to the specialty. To all who have been his students, he will be remembered as a real scientist, a kindly, modest man whose life and work were accompanied by a zeal and sincerity that was amazing.

The name Oppenheim will go down in the history of his chosen specialty, as one of its most important scientific contributors, and will be an inspiration to orthodontists for all time.

Communication

JOURNALISTIC SABOTAGE

ANOTHER one of the associate editors of this JOURNAL, Dr. Joseph D. Eby of New York, has contributed much over a period of many years to orthodontic literature, and the JOURNAL published much of his manuscript on maxillofacial surgery during World War I.

Dr. Eby, along with many others, has been sufficiently exercised over the injustice done to the JOURNAL and the American Association of Orthodontists by the so-called propaganda committee of the American College of Dentists, that he has made a complete documentary report on the subject, which follows.

This report, the readers will note, has been directed in the form of an open letter to the Regents of the American College of Dentists, The Trustees of the American Dental Association, and The Directors of the American Association of Orthodontists. It is to be hoped that this report, along with the letters of protest by Dr. James D. McCoy of Los Angeles, and others, will reveal to the readers of the AMERICAN JOURNAL OF ORTHODONTICS AND ORAL SURGERY the false and stupid character of the report sent out by the American College of Dentists' propaganda committee last summer.

The reprint making the false and misleading charges was sent to the entire membership of the American Dental Association and has been responsible for grave repercussions within the orthodontic specialty.—*Editor.*

New York, N. Y.
January 21, 1946

To:

THE REGENTS OF THE AMERICAN COLLEGE OF DENTISTS
THE TRUSTEES OF THE AMERICAN DENTAL ASSOCIATION
THE DIRECTORS OF THE AMERICAN ASSOCIATION OF ORTHODONTISTS

Dear Sirs:

During 1945 a printed pamphlet containing a "Report of the Committee on Journalism of the American College of Dentists" was mailed to the membership of the American Dental Association. According to figures submitted by Dr. Paul W. Zillman (Chairman of the Membership Committee) as of Sept. 17, 1945, this organization had 51,811 regular members, 3,976 junior members, 682 life members, or a total of 56,469.

A preface on the front page of this pamphlet, signed by Dr. O. W. Brandhorst, Secretary, stated that the principal object of the "unremitting" campaign of the American College of Dentists has been to eliminate the "degrading" influences of commercialism in dental journals.

Information requested of Dr. Harry B. Pinney, Secretary of the American Dental Association, as to the release of the mailing list of the American Dental Association for this widespread purpose brought the following reply: "The business manager is authorized to direct our addressograph department to address envelopes for outside organizations providing our regular fee of $4.00 per thousand units is paid. I am informed that the request for our service in the case you cite was made by Dr. Harold S. Smith of Chicago, Treasurer of the American College of Dentists. No information was submitted as to the character of the material to be mailed and none was requested."

We are here concerned with that part of this pamphlet which deals with the American Journal of Orthodontics and Oral Surgery. General information furnishes little or no evidence as to the basic object which was hoped to be accomplished by this laborious and

expensive effort. The prevailing questions have been: who instigated this movement; who authorized it; how was the expense accounted for? General comment among the orthodontic group has dealt principally with the inaccuracies, the unfairness, and the apparent prejudice of the Report itself. Comment from the profession at large has been expressed in the feeling that this is a matter which should be settled by direct contact between the parties involved. By and large the reception given this Report has been critical both of its method of distribution and its object, which seemingly have provoked more curiosity than the nature of the Report itself.

The first sentence in the Report which alludes to the American Journal of Orthodontics and Oral Surgery reads as follows: "Among the subscription journals is the American Journal of Orthodontics and Oral Surgery which was classified in the Commission's first report as being corporate controlled. This status has not been changed." The "first report" referred to appeared in the volume of the Report to the American College of Dentists for 1928 to 1931, published in 1932, at which time Dr. Bissell B. Palmer of New York City was Chairman of this Committee on Journalism, which was then known as a Commission.

It is an actual fact, regardless of any appearance to the contrary, that The C. V. Mosby Company has never exercised any authority or control over the literary contents of the American Journal of Orthodontics and Oral Surgery, or of the policies of the editorial staff. After twenty years of editorial association with this Journal, it is my privilege to know of the part which the Mosby Company has played in the printing of this Journal, and in assuming the financial responsibility for high-class production on the chance of gaining such profits as it might legitimately earn or at the risk of sustaining such losses as might occur.

In the intervening period of years following this "first report" published in 1932, there appeared Volume 5 of the Annual Proceedings of the College in 1938. On page 100 of this issue is published a report containing a new classification of dental journals. This is as follows:

(A) Periodicals controlled and owned by dental societies.
(B) Periodicals controlled by dental societies but privately owned.
(C) Periodicals privately controlled by (a) owners exclusively engaged as publishers or (b) owners not engaged exclusively as publishers.

On page 101 of this same volume appears a statement that the American Journal of Orthodontics and Oral Surgery has been temporarily placed in Class *B*, under a probationary measure. Two meetings of the American Association of Orthodontists were to be allowed to convene, namely 1938 and 1939, in order that the necessary measures could be carried out by the Association to effect a contract with the publishers of the American Journal of Orthodontics and Oral Surgery which would be in keeping with the higher classification. In this Report (1938) the Committee on Journalism also spoke in confidence of orthodontics and the orthodontic profession, was complimentary of its existent literature, and stated that it was the commercial relationship between the American Association of Orthodontists and the publishers of the Journal which was their primary concern.

On page 103 of Volume 5 appears the following: "Professional control not nature of ownership is the basis of the present classification of dental journals as endorsed by the American College of Dentists." According to this statement the College does not seem to be concerned as to whether the Mosby Company published the Journal or not, but as to whether the Journal itself is under professional control. However, the period of probation expired and the Committee on Journalism of the College, not having received any official communication from the American Association of Orthodontists, automatically reverted the Journal back into Class *C*.

In Volume 6, page 154, published by the College in 1939 the following statement appears in a further report of the Committee on Journalism: "The American Journal of Orthodontics and Oral Surgery although classified as a proprietary journal received nearly all its original articles from a professional organization. It should by right be placed in the non-proprietary

group.'' So it appears that despite the fact that this Committee on Journalism imposed under its own authority a probationary penalty and subsequently carried it out, nevertheless they still recognized the fact that the American Journal of Orthodontics and Oral Surgery was so conducted that by right it should have been placed in the nonproprietary group.

That the American Association of Orthodontists did not conform to the directions issued to them by the Committee on Journalism within the probationary period might provoke considerable discussion, but should have no bearing on the Report submitted by the Committee in Chicago as of October 18, 1944.

It is a fact that the American Association of Orthodontists and The C. V. Mosby Publishing Company entered into a new contract under date of May 1, 1940. This contract was signed by Dr. William A. Murray, then president of the American Association of Orthodontists; Dr. Brooks Bell, chairman of the Publications Committee; and Mr. John C. Mosby, then vice-president of the C. V. Mosby Company.

This contract has been reviewed by legal counsel and pronounced binding on the parts of both contracting parties, and would be so held by any court of law to which it might be submitted in case of dispute. The contract is established indefinitely as shown by the following quotation: ''It shall continue in effect until one or the other of the parties mentioned above shall ask for termination of said agreement, in which case either party wishing to terminate said agreement shall give the other party one year's notice in advance.''

Opportunity has also been taken to discuss this contract both critically and constructively with a number of the Fellows of the American College of Dentists of fair, unbiased opinion, and they have agreed that the contract also possesses strong moral bonds, such as should exist and be expected among men whose professional and personal integrity is above reproach. It is the unanimous opinion of these men (whom every Fellow of the College would hold in high respect) that the only changes necessary in the present contract would be in the matter of phrasing, wherein a few words could be changed to express more specific meaning. As a matter of fact, they suggested that perhaps the contract would be strengthened if one or two clauses were removed rather than to make further additions. In view of these facts, it is obvious that the dogmatic statement concerning the status between the American Journal of Orthodontics and Oral Surgery and the American Association of Orthodontists as not having changed since 1932 is entirely incorrect.

The second statement in the current Report of the Committee pertaining to the American Journal of Orthodontics and Oral Surgery reads as follows: ''Since the creation of the Journal of Oral Surgery under the sponsorship of the American Dental Association there is a noticeable change in the number of literary contributions published in the orthodontic section of the American Journal of Orthodontics and Oral Surgery. In a circularized report by the publishers of the Journal for the first six months of 1944, it is singular that in the orthodontic section only 16 contributions were published while the oral surgery section contained 44.''

There are several facts to be considered in refuting this statement, which should answer to everyone's satisfaction any question regarding the difference in volume of the two sections. In the first place, the very nature of this part of the report implies suspicion and prejudice against the Journal on the part of the Committee on Journalism of the College . . . and the inference contained in the term ''singular'' suggests that a deliberate injustice was committed by them for want of real information.

In the arrangement between the editorial staffs of the orthodontic and oral surgery sections of the Journal with the Mosby Company, a certain and equal number of pages are allotted in every monthly issue to each section. All or any part of this equal volume of space may be filled by each department monthly to the extent to which it has material suitable for publication.

During the period criticized in this report by the difference of 16 orthodontic articles to 44 oral surgery, it may be stated that due to the unfortunate circumstance of war all scientific orthodontic meetings were suspended. The American Journal of Orthodontics and Oral Surgery has been principally dependent upon the annual meetings of the American Association of Orthodontists and the annual or semiannual meetings of the seven sectional orthodontic societies for the literature it has published during the last thirty years.

A count through the programs of the last twelve meetings of the American Association

of Orthodontists reveals an average of nine papers per meeting scattered over a three-day scientific session of the Association. The New York Society of Orthodontists holds a two-day meeting twice per year, and the other six sectional societies average at least one two-day meeting per year. This makes an aggregate of nineteen meeting days for this combined orthodontic assemblage for one year, which would easily average a total of at least fifty publishable papers. There are, in addition to these, presidents' addresses, resolutions, case reports, publishable clinics, the presentation address for the Albert H. Ketcham Award by the president of the American Board of Orthodontics, the acceptance address of the recipient, as well as other forms of literature. These official sources of material have been cut off by the postponement of orthodontic meetings but will naturally return when these scientific sessions are resumed.

The only other sources of orthodontic material are an occasional thesis, written by an applicant for certification by the American Board of Orthodontics, which the Board deems of sufficient originality and quality to release; an occasional article drifting in from some foreign source; articles by invitation, wherein the editorial staff of the Journal might invite an orthodontist to write a paper; or original contributions voluntarily sent in. These latter usually come to the Editor with the request to "please publish" and are referred to the associate editor of the section whence they originate. The rule is that such papers are carefully read by this associate editor, the author investigated if not well known, and the scientific validity of the material ascertained. Many of these voluntary contributions are either duplication, poor in quality, or otherwise unacceptable for publication. It has been the courageous determination of the editorial staff of the orthodontic section rather to see its pages go vacant than to permit the standards of quality to be lowered just for the sake of filling space.

Another point in the consideration of the differences in the volume of space consumed by the two sections lies in the fact that at no time in history has the world been so full of oral surgical material. With the war bringing a natural increase in maxillofacial injuries and diseases, both in industrial as well as combat spheres, an increased interest and emphasis on oral surgical subjects would be expected. In the light of these facts there seems to be a rather unkind touch in this part of the Committee's Report.

The implication that the Mosby Company would deliberately enter into open competition with the American Dental Association's Journal of Oral Surgery is so far from fact as almost to transcend the most vivid imagination. In this particular connection a letter was addressed to an officer of the Mosby Company, and on December 3, 1945, a reply was received from which the following paragraph is taken: "You ask whether or not the Mosby Company has emphasized the publishing of material relative to Oral Surgery after the American Dental Association launched their new Journal on Oral Surgery. We can answer this with a capital *NO*. The Journal carried the oral surgery section long before the American Dental Association thought of such an enterprise."

Another phase of this Report reads as follows: "Does this imply that the economic returns to the owners of the Journal are being jeopardized through the competition of the Journal of Oral Surgery and that more effort is being made to feature the oral surgery section?" This quotation indicates doubt on the part of the Committee itself and tends to plant suspicion in the mind of the reader.

The Report also contains the following statement: "There seems little justification for such a large specialty group as the orthodontists to permit a commercial journal *over which they have little if any control* to publish their official proceedings when the Association is paying $6,078 to the publishers for the privilege of furnishing its members 716 volumes of the Journal per year."

The fact is that under the section of the contract between the American Association of Orthodontists and The C. V. Mosby Company, entitled "Financial Agreement" and effective as of May 1, 1940, appears the following: "The publisher agrees to furnish an *en bloc* subscription of the Journal to the members of the American Association of Orthodontists at a subscription rate of $5.00 per member per year. Said *en bloc* subscription shall be paid from the treasury of the American Association of the Orthodontists to The C. V. Mosby Company on or before March 15th of each calendar year."

Reference to this part of the 1940 contract, as above quoted, proves that this agreement had been in force for two years prior to the time mentioned in the Committee's Report, and that the amount of money paid by the American Association of Orthodontists could not have exceeded $5.00 per eligible member. It therefore appears that there is considerable inaccuracy in the Committee's statement that $6,078 was paid by the Association to the publisher of the Journal.

In a personal letter from Dr. Black under date of Aug. 6, 1945, appears the following: "You question the statement made as to the amount paid the Mosby Company for the yearly issues of the Journal furnished the members of the American Association of Orthodontists. My information was taken from the Standard Rate and Data Service publication of Dec. 15, 1943, in which is published the sworn statement of the Mosby Company that as of 6/30/43 the subscription cost of the American Journal of Orthodontics and Oral Surgery was $8.50, and the number of subscriptions furnished the Association members was 716. I must plead guilty to a typographical error of $8 the Committee made in the report."

For information as to costs of *individual* subscriptions to the Journal there appears on the inside of the front page of every copy this statement: "The American Journal of Orthodontics and Oral Surgery is published Monthly by The C. V. Mosby Company, 3207 Washington Blvd., St. Louis 3, Mo. Subscription Price: United States, Its Possessions, Pan-American Countries, $8.50; Canada, $10.00 (Canadian Currency); Foreign, $9.50. Entered as Second-Class matter at Post Office at St. Louis, Mo. under Act of March 3, 1879." Dr. Black, obviously unaware of the terms of the contract between the American Association of Orthodontists and the Mosby Company, has assumed that all *membership* subscriptions are carried at this *individual* rate.

A letter dated Sept. 17, 1945, from Dr. Max E. Ernst, Secretary of the American Association of Orthodontists, states that on that date there was a total of 771 Association members. Seven hundred seventy-one multiplied by $5.00 for each annual subscription, paid through dues to the American Association of Orthodontists, should approximate the amount payable to the Mosby Company for membership subscriptions in 1945.

The fact that the Mosby Company has the privilege of issuing individual subscriptions at the above listed personal rates is greatly to the advantage of the progress of orthodontic science, since in those sections outside the United States, particularly throughout the twenty-two Pan-American countries, the Journal through its pages can transmit volumes of knowledge to orthodontists in foreign countries and to others who are not members of the American Association of Orthodontists.

As a matter of journalistic efficiency, both from the administrative as well as the economic point of view, surely no committee on journalism would want the American Association of Orthodontists to narrow the confines of its publication to its own sphere and leave the entire outside world deprived of the benefits so splendidly provided under the present plan.

The Standard Rate and Data Service, quoted by Dr. Black as his authority for the figures mentioned, is purely a service to advertisers and advertising agencies. In a visit to their New York City Office, during the first week of December, 1945, I found their current report on the American Journal of Orthodontics and Oral Surgery as circulated under date of November 15, 1945.

This report had been sworn to as of June 30, 1945, for the previous six-month period.

The 716 Association members' subscriptions referred to by Dr. Black as of June 30, 1943, are included in the report as "nondeductible Association subscriptions."

These exact figures for any one year either could have been procured directly from The C. V. Mosby Company upon request by Dr. Black, or he could have at least written Dr. Max E. Ernst, Secretary-Treasurer of the American Association of Orthodontists, and received the correct information.

From these facts and the documentary evidence as quoted, it seems that Dr. Black and his Committee consulted a remote source, which accounts for the total inaccuracy of their figures.

Under the existing contract between the American Association of Orthodontists and The C. V. Mosby Company (as of May 1, 1940), the seven associate editors are elected by the seven sectional orthodontic societies of the United States and Canada. My present incum-

bency as an associate editor, duly elected by the New York Society of Orthodontists, is an honor bestowed following twenty years of service in that capacity by appointment. It is a fact that no politics have been pursued in any of the sectional societies, and no effort has been made on the parts of the Editor-in-chief or the Mosby Company to influence these elections in any way. It so happens that five of these associate editors are past-presidents of the American Association of Orthodontists, as is the Editor-in-chief, making a total of six out of a staff of eight. These are men of integrity whose devotion to dentistry and orthodontics has long since been proved. It would be impossible for the Mosby Company, the Editor-in-chief, or even the American Association of Orthodontists itself, to force any policy which would border on a commercial taint, or anything else contrary to the combined will of these associate editors. Their individual duties are to see that the literature and proceedings of their respective societies are promptly edited and prepared for publication; their collective duty is to protect the interests of the Association and the Journal.

In this connection I personally work in conjunction with Dr. J. A. Salzmann, Editor of the New York Society of Orthodontists and Associate Editor of the Department of Abstracts and Reviews of our Journal. In these capacities there is no one more naturally endowed than Dr. Salzmann, and likewise as an asset to any journal his nationally established reputation as an author is of the finest. The same may be said of Dr. Walter T. McFall of Asheville, N. C., in his capacity as Consulting Editor, Dentistry for Children. As an orthodontist he has long been recognized as a leader in this branch of dentistry, which is so vitally linked with orthodontics.

The Editor-in-Chief of our Journal is at all times in close contact with his associate editors and does not make any decision of importance with regard to the conduct of the Journal without their approval. In fact, it would be almost impossible to effect a better-organized editorial staff for any dental journal, nor could there be better protection from commercialism and other outside agencies.

It is also a fact that neither The C. V. Mosby Company, the Editor-in-Chief, nor anyone else, for that matter, is consulted by the sectional societies for approval of the associate editors whom they elect. The Mosby Company has demonstrated many times that it does not care to interfere with such a fine organization, except to produce its material in the best way and to the best professional advantages.

The associate editors receive no pay for their services. The Editor-in-chief receives no salary for his services, and only a nominal allowance which partially covers his secretarial costs.

To the Regents of the American College of Dentists:

Solemn consideration should be given the relative justice and injustice of that part of the current Report which pertains to the American Journal of Orthodontics and Oral Surgery and the American Association of Orthodontists. The American Association of Orthodontists as a highly scientific body has been conducting its own affairs successfully for forty-five years, and its standing as one of the finest dental specialty organizations of America should be respected. For these reasons it is my belief that a public statement should be prepared retracting that part of the Committee's Report which refers to the American Journal of Orthodontics and Oral Surgery; and that a communication should be sent directly to the American Association of Orthodontists explaining both the object of this Report as well as what was expected to be accomplished by the distribution of copies to the entire membership of the American Dental Association.

This communication is addressed strictly of my own volition and without the suggestion of any individual or group.

Respectfully submitted,
(Signed) Jos. D. Eby.
Past-President, American Association of Orthodontists
Past-President, New York Society of Orthodontists
Associate-Editor, American Journal of Orthodontics and Oral Surgery (representing the New York Society of Orthodontists)

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There may be members in the Service whose names do not appear in the above list. These members should notify the secretary at once so that their names may be included.

Max E. Ernst, Secretary, American Association of Orthodontists, 1250 Lowry Medical Arts Bldg., St. Paul, Minn.

Department of Orthodontic Abstracts and Reviews

Edited by

Dr. J. A. Salzmann, New York City

All communications concerning further information about abstracted material and the acceptance of articles or books for consideration in this department should be addressed to Dr. J. A. Salzmann, 654 Madison Avenue, New York City

Body Mechanics and Posture: By K. G. Hansson, M.D., New York, J. A. M. A. **128:** 947-953, July 28, 1945.

By body mechanics is meant both the static and the functional relationship between the parts that make up the body, and the body as a whole. The study of body mechanics is of as much value in the prevention as in the cure of pathologic conditions of the body.

Our body build is largely inherited, just as are the shapes of our features. Our features cannot be changed, and neither can our body build. However, the interrelations of the 200 bones or more which are joined together by ligaments and acted on by muscles are subject to the same mechanical laws and forces which control any other machine. The maintenance of body function, of health, of life itself is concerned with balance between antagonistic forces. Balance is the motivating force in good posture. When this balance is disturbed by fatigue, accidents, disease, or occupation, the efficiency of the body as a machine is lowered. It may be said that physical laws applied to our body mechanics give the answer to the question whether posture is related to physical health.

Orthopedic surgeons have overwhelming evidence for the importance of body mechanics both as a preventive and as a curative agent. Foot strain, knee pain, backache, and many other complaints come daily under their observation and may be eliminated or improved by correction of body mechanics. (This is true also of dentofacial imbalances.—J. A. S.)

Man represents the highest development in biped skeletons. The spine changes little, but the head and extremities show pronounced changes. The skull becomes bigger and heavier, especially the frontal and parietal bones. This heavier head is balanced on the cervical spine with the convexity forward. The scapulas are displaced downward, giving a longer neck with more mobility, which compensates for the fact that the eyes are directed forward. The keynote of construction in the shoulder and upper extremity is mobility and speed rather than support. The human clavicle is long in order to hold the shoulder girdle away from the sternum. Thereby the clavicle becomes parallel to the posterior ribs rather than to the lateral ribs as in the quadruped. The glenoid fossa is small, allowing free movement of the humerus, and this movement is restricted and protected by the elbow; the slightly separated bones in the wrist and the separation of the thumb from the other fingers are characteristic of the human skeleton.

The biped thorax has its greatest diameter from side to side, with a wide costal angle. The first rib is almost horizontal, and the last rib is nearly vertical and may produce periosteal irritation with the transverse process of the vertebrae.

The spinal column, originally intended for swimming and crawling, presented a convexity posteriorly. The baby is born with a one-curve spine, but when it can raise its head the cervical curve develops, and when it can stand the lumbar curve is formed. The sacral and coccygeal vertebrae help to reinforce the pelvis. The spine, with its strong vertebral bodies, its numerous processes, and the intervertebral cushionlike disks, is a marvel of elasticity and strength. There are many variations of the spine, both as to number of vertebrae and as to degrees of the curves. They may be regarded as evolutionary progression or retrogression. Thus a lumbar spine of four vertebrae may be considered as a progression and the one curve spine in spondylitis as a retrogression.

The force of gravity, transmitted through the spine, is received by the sacrum at an angle. The anterior surface of the sacrum is broader than the posterior surface, and therefore a certain amount of anterior-posterior motion is possible. However, any displacement between sacrum and iliac bone is questionable. The lumbosacral articulation is more commonly involved in pathologic conditions of the lower part of the back. Here a freely movable spine meets a rather rigid pelvic girdle. In the quadruped the sacrum and the ilium are long, narrow bones, while in the biped there are broad, flaring sacrum and iliac bones. These, together with ischial and pubic bones, support the viscera above, protect the reproductive organs within, and serve as muscular attachment for the powerful walking muscles. A plane laid through the symphysis pubis and posterior superior iliac spine is at about 40 degrees with the vertical frontal plane. The analyses of these planes are important when dealing with body mechanics, because the pelvis works as a double lever with the fulcrum in the hip joint, and any changes in these planes have an important bearing on the position of the spine.

The angle of the neck of the femur is depressed from 150 degrees in the quadruped to 125 degrees in adult man. The head and neck are rotated forward, so that on standing most of the head looks forward. The femur is bowed forward in man, and it was from the study of the histologic construction of the femur that Wolff evolved his law of functional adaptation. Most quadruped knees are held in flexion, while the human weight-bearing knee supports the body weight in extension. The medial condyle of the femur is more distal than the lateral one, which projects forward slightly. This projection prevents the slipping of the patella when the quadriceps contracts. The line of gravity falls slightly to the outside of the middle of the knee joint as the result of the valigty. This is even more pronounced in knock-knees, while in bowlegs gravity falls toward the median side. Knock-knees are more prone to give trouble than bowlegs and often show ligamentous strains and patellar deviations.

It might be suspected that the change to the erect posture would be pronounced in the foot, which is the point of contact between the skeleton put on end and the ground. This is the case. The tarsal and metatarsal bones are in closer apposition than are the corresponding quadruped bones. The development of the horizontal and transverse arches are seen. The big toe is held in extension and close to the other toes, which are held in flexion. The inverted foot of the tree-climbing ape is now everted, and the heel, the outer edge of the sole, the distal ends of the metatarsals, and the entire hallux are developed for weight-bearing purposes.

The Muscular System.—The changes in the skeleton are mainly determined by muscles. The afore-mentioned skeletal changes are therefore to be considered in the light of trophic stimuli of function.

The quadruped holds up his head by means of a powerful ligamentum nuchae, which is aided by strong posterior neck muscles. In the human being the skull is delicately balanced on the cervical spine, the ligamentum nuchae is rudimentary and the neck muscles act like guy ropes. It is easy to understand that if the human construction of head balancing is forced to hold the head in the quadruped way, an undue strain is put on the posterior neck muscles. This is what takes place when one sits in a slouching position with the chin touching the chest, and it will result in a myositis that is often encountered and not easily dealt with unless the position of the head is corrected.

The trapezius, the levator scapulae, and the rhomboids help to hold the scapulus in place. When the shoulders are allowed to slide forward and down, pressure symptoms may develop from the cervicobrachial nerves and the blood vessels.

The development of the deltoid in man is related to the increased motion in the glenoid fossa. This has been obtained at the expense of power and stability. One recognizes this in the whole upper extremity. A phylogenic study of the upper extremities shows that abduction, external and internal rotation in the shoulder joint, supination and pronation in the forearm, and apposition of the thumb to the other figures are more recent developments. It is also of interest to speculate on the fact that these phylogenically younger movements are the first ones lost and last ones regained in many pathologic conditions. These are probably examples of specific morbidity.

Although we have seen how the stimulation of muscular contraction affects the bone production, the question of how the osteoblasts rearrange their alinement and production can be answered only by scientific speculation, because of our limited knowledge of biochemical and electrothermic processes. However, it can be assumed that the nervous system plays some part in this trophic change because of the absence of functional response in cases of paralysis.

By muscle tonus is meant the slight persistent tension which is characteristic of a healthy muscle. This tonicity is of the greatest importance in the maintenance of good body mechanics. Our knowledge of muscle tonus is rather limited, but it can be safely stated that the brain and the spinal cord, as well as the impulses arising in the muscles themselves, take part in the control, production, and maintenance of the muscle tonus.

Closely associated with the nervous control of body mechanics are the endocrine organs. Study of pathologic conditions of the pituitary gland leads to the deduction that there is some control by this gland over the growth of bones. The pituitary disease called acromegaly, in which the response of the osseous tissue to external stimuli is much increased, forms a beautiful example of Wolff's law. The voluntarily most active parts of the body are the lower jaw, the hands, and the feet, and these parts are much overdeveloped in patients suffering from acromegaly.

From similar observations it is known that the overactivity of the thyroid gland produces a slender body type and that diminished activity of the thyroid produces the stocky type of myxedema. The same considerations apply to the thymus, ovaries and testis, all of which, to a certain extent, determine growth and nutrition.

The human body cannot be standardized, and individuals, therefore, cannot be made to conform to any definite preconceived standard physically, mentally, or spiritually. Two contrasting body types must be recognized. There is the slender, high-strung body build, often referred to as the carnivorous type. The other extreme is the stocky, placid type, also known as

the herbivorous type. In between are all grades of variation. The posture standards illustrated here can be obtained from the children's Bureau, Department of Labor, Washington, D. C. Although photographs and x-rays are valuable, they are not always practical. The physical examination should note the following:

1. Drop a tape measure from the mastoid process over the acromial process; it should hang over the greater trochanter and external malleolus. Also drop a tape measure from the posterior process of the seventh cervical vertebra; it should hang midway between the buttocks, the knees, and the malleoli.

2. With the patient placed with his back to the wall and the feet 1 inch away, there should be only slight curves in the cervical, dorsal, and lumbar regions. The chin should be pulled in over the sternal notch. The sternum should be the farthest forward part of the body, with the costal angle wide. The lower abdomen should be flat. The lower extremities should be properly alined with the pelvis and the trunk. The femur and tibia should be perfectly opposed in the knee and this maintained by proper muscle balance, favorable to the weight-bearing lines which protect the joint mechanism of the feet.

3. The body in motion must also be examined. Let the patient walk about the room and also jump on the right and left foot alternately. This will give an idea of the patient's motor habits.

The causes of poor body mechanics may be considered under overactivity, insufficient or improper food, weakness against gravity, and inherited or acquired faulty positions or movements.

Complete rest position should be approached as much as practically possible. This can be accomplished only on a hard mattress, with no pillow or a very small one. A small pillow under the knees will relax the iliopsoas and produce the anatomic rest position in the lower back, hips, and knees. This position will rest the balancing mechanism, which means that the nervous and muscular systems cease working at high speed and have a chance to recuperate. The circulation becomes horizontal, with less demand on the heart and blood pressure. Gastrointestinal distress is often relieved by the recumbent position, respiration is easier and slower, and there is less strain on ligaments and cartilages.

Therapeutics in any field of medicine must be directed against the cause in order to be successful. If this is remembered when one is dealing with faulty body mechanics, it must be realized that exercises are not always the answer to poor posture. However, when exercises are indicated, they must be picked with discrimination. It must be realized that every effort to change voluntarily the relative position of the parts of the body is made through the use of the motor habits, which are expressed in the body alinement. To change posture, motor habits must first be changed in the motor pathways in the nervous system. With this change a different muscular response, both for balance and for movement, will occur. This is best accomplished by slow and oft repeated movements and the visualization of stabilized relationships of the various parts of the body during movement.

The principle of posture exercises is best expressed by Cochrane: "If proper posture be maintained by conscious effort for a short time, then the increase of reflex tonus obtained by such posture will serve to maintain the proper attitude without the patient's requiring to give the matter thought and attention." The earlier such posture teaching occurs, the better, since age intensifies muscular habits.

The question of posture standards is not satisfactorily solved, but a certain amount of literature can be obtained from the Children's Bureau, Department of Labor, Washington, D. C.

Migrations of Teeth Following Extractions: By Sheldon Friel, B.A., M.Dent.Sc., Sc.D., *Proc. Roy. Soc. Med.* **38**: 22-28, June. 1945.

Early dental literature noted that there were changes in relationship of the teeth following extraction of deciduous or permanent teeth in the growing child. Hunter, Salzmann, Dewey, and other writers state that molars tend to come forward, especially in the upper jaw, and that teeth anterior to molars tend to go backward, especially the lower second premolar after the loss of deciduous or first permanent molars. Turner asserts that lower molars never move forward.

The general hypothesis which I have to present is that all teeth move forward and none backward. A break in the continuity of the arch made by tooth extraction may have different effects on the crowns and roots of teeth in different parts of the dentition, all of which can be explained in terms of the paths of eruption and of the forces acting on the teeth during eruption. These effects will be modified by the time of extraction, by the tooth or teeth extracted, and by the normal or deficient growth of the individual.

Room is obtained for the eruption of the successive molars by forward movement of the teeth anterior to them, due to deposition in the alveoli. There is, in addition, upward and outward movement of the mandibular teeth through deposition, both alveolar and on the outer surfaces. This is, of course, counter to the view of Hunter that room was made for the molars by absorption of the anterior border of the ascending ramus, compensated by deposition on the posterior border.

The vertical movement in the upper is very much greater than in the lower. The superposition demonstrates also the growth of the condyle and ascending ramus which compensates in part for the downward growth of the upper and upward growth of the lower alveolar borders. The remainder of the compensation comes from the growth of the skull base carrying downward and backward the glenoid fossae.

The following is clinical evidence of the normal forward movement of upper and lower teeth during the various transitional periods of the development of the dentition:

1. Serial drawings of the upper teeth and the rugae demonstrate that the teeth are moving forward in relation to the rugae. Brash (in a personal communication) showed that the bony rugae of the palate of the pig are also moving forward during its downward and forward growth, so that the teeth must be moving forward through the bone at a greater rate than the rugae.

2. The occlusion of the deciduous teeth at 3 years of age is very definite. The cusps are sharp and the fossae deep. The distal surface of $\frac{e}{e}$ is in the same vertical plane. From 3 to 7 years of age the arches increase in size, the cusps of the teeth become worn, and the lower teeth move forward in relation to the upper teeth, so that the distal surface of $\frac{e}{e}$ are no longer in the same vertical plane but the lower is anterior to the upper. This allows $\frac{6}{6}$ to occlude correctly, i.e., the point of the mesiobuccal cusp of $\underline{6}$ is a little in advance of the buccal groove of $\overline{6}$ but the triangular ridge which runs up from the point of the cusp distolingually is in the buccal groove.

3. If unworn $\frac{7,6}{7,6}$ are removed from a skull, $\frac{6}{6}$ then occluded to their normal relationship for 7 years of age and $\frac{\overline{7}}{\overline{7}}$ in their normal relationship, it will be found that when $\overline{7},\overline{6}$ are in contact there is always a space between $\underline{7},\underline{6}$, showing that $\overline{6}$ must alter its relationship with $\underline{6}$ and move forward. This occurs after the loss of $\frac{\underline{e},\underline{d},\underline{e}}{\underline{e},\underline{d},\underline{e}}$. The mesiobuccal cusp point of $\underline{6}$ is no longer anterior to the buccal groove of $\overline{6}$ but opposite it. The cusp point of $\underline{7}$ can then be opposite the buccal groove of $\overline{7}$. In $\frac{\overline{7}}{\overline{7}}$ the triangular ridges of the mesiobuccal cusps run more transversely than in $\frac{6}{6}$ so that the point of the cusp and triangular ridge are more in line. It is sometimes stated that the greater forward movement of the lower deciduous teeth as compared with the upper between 3 and 7 years of age is not necessary as after the loss of $\frac{\underline{e},\underline{d},\underline{e}}{\underline{e},\underline{d},\underline{e}}$, $\frac{\underline{\quad}}{6}$ will move forward more than $\underline{6}$ and will allow $\frac{6}{6}$ to occlude, the triangular ridge of the mesiobuccal cusp of $\underline{6}$ being in the buccal groove of $\overline{6}$. I have not yet seen a case where these two types of forward movement described under headings 2 and 3 are not necessary for the ideal occlusion of the second molars.

It sometimes occurs that $\underline{e,d}$ are lost some time previous to $\overline{e,d}$ and vice versa. In serial models of these cases, the forward movement of $\underline{6}$ or $\overline{6}$ following alternate loss of $\underline{e}$ or $\overline{e}$ can be demonstrated.

The evidence that I have put before you of the normal development of the jaws and the dentition is altogether in favor of the forward movement of all teeth, and I have not been able to find any evidence that teeth move backward except when driven backward by an outside force, e.g., an erupting canine might drive a first premolar distally where there was room for the tooth to move.

What I have described is the normal course of events during development. But with the loss of a unit or units from the dentition before the eruption of the "replacement" teeth is complete, we get, as Hunter and others said, considerable changes in the subsequent picture. The changes vary in degree with the time at which the unit is removed, and with the vigor of growth of the jaws, but the general tendency is for the forward movement of the roots to continue while the crowns of the teeth other than the molars lag behind. This tendency is most pronounced in the lower second premolar but it exists in all teeth other than the molars. One sees at times even the center point of the upper or lower arch shifting toward the side from which a tooth, even as far back as a first permanent molar, has been lost, due to the lag of the anterior segment on the side of the extraction. Obviously, the explanation lies in the loss of continuity of the arch. The pressure of crown is clearly an important factor in keeping teeth vertical while their roots are carried forward. What requires elucidation is mainly the difference in degree of distal tilt assumed by upper and lower premolars in general and the extreme case of the lower second premolar.

My thesis is that $\underline{7}$ has normally about four times as far to travel as $\overline{7}$ in vertical movement to get into place behind $\underline{6}$. To get into the place of $\underline{6}$ when that tooth is lost, a slight change of angle of descent, and hence only a slight increase in distance of movement, is necessary; $\overline{7}$ in similar circumstances has to make a much greater change of angle and consequently the increase of travel called for is much greater.

Assuming at the time of extraction of $\overline{6}$, $\overline{7}$ has still 6 mm. of vertical movement to get into its normal occlusion (which is probably a reasonable figure, but any other figure can be assumed without affecting the argument), then $\overline{7}$ will have 24 mm. to travel. Now suppose $\overline{6}$ is removed. If $\overline{7}$ is to get into a position where it will replace $\overline{6}$, the shortest distance it can travel will be (taking the mesiodistal diameter of $\overline{6}$ as 12 mm.) a fraction over 13 mm. or rather more than double its normal travel. Compare with that the increase of $\overline{7}$'s travel required in similar circumstances. Its shortest path to occupy the place of $\underline{6}$ (11 mm. mesiodistal diameter) would be 25.7 mm., an increase of one-fourteenth on its normal travel to get into occlusion. So that unless there is a great acceleration of $\overline{7}$'s movement, it will arrive in the place of $\overline{6}$ at a much later date than will $\underline{7}$ replace $\underline{6}$.

My observation is that, in fact, it is upper teeth which are accelerated in eruption by premature loss of deciduous teeth or by loss of more anterior permanent teeth. The effect of the very early replacement by $\underline{7}$ in the space of $\overline{6}$, as compared with replacing $\overline{6}$, is of course that any tendency for the crown of $\overline{5}$ to lag behind the root is early checked by the crowns coming into contact, whereas in the lower, months or even years may elapse before $\overline{7}$ has made its extra distance, and consequently the distal tilting of $\overline{5}$ has full scope to show maximum effect.

Salzmann illustrates, by courtesy of Broadbent, a case at 10 and 13½ years of age, where seven premolars are congenitally absent; $\underline{e,d}\rfloor$ and $\overline{e}\rfloor$ are present and there is a space between $\overline{3}\rfloor$ and $\overline{d}\rfloor$. When a line is drawn perpendicular to the Frankfort plane from the registration point, it is seen that $\underline{e}\rfloor$ and the teeth distal to it are moving forward and that $\underline{3}\rfloor$ and the teeth mesial to it are also moving forward. It is additional evidence of forward movement of teeth, but the fact that the crowns remain out of contact does not invalidate the proposition that crowns tend to lag behind when the growth of the bone is carrying the roots forward. That is clearly determined by the vigor of growth. Even in this case it is quite possible that the teeth in the anterior segment have lagged somewhat behind. The fact that the space for $\overline{d}\rfloor$ has almost disappeared makes it clear that the anterior teeth are not traveling forward as fast as the posterior.

I have tried to show the difference between the direction of growth in the upper and lower jaws and I think this difference will explain the varying behavior of upper and lower migrations of molars and premolars following a break in the continuity of the arches. There is in addition a difference in the developmental position of upper and lower premolars. The upper premolars are never far from the alveolar margin and the alveolar growth, owing to the small intervening space between the floor of the antrum and the alveolar margin. On the other hand $\overline{5}$ is developed very low down and if its predecessor $\overline{e}$ is lost prematurely, the crown of the premolar can be left behind in the

forward growth. The roots of the deciduous molars bring forward the crowns of the premolars.

There is also a difference of degree in the amount of forward movement of teeth anterior and posterior to a break in the arch due to normal or deficient growth of the child. In the normal growing child the anterior segment tends to keep growing and in some cases the posterior segment is not able to overtake it and close the space. In the child suffering from deficient growth, the anterior segment lags behind and the posterior segment rapidly closes the space. This has an important bearing on the prognosis of treatment of crowded incisors by the extraction of first permanent molars. In the child with deficient growth you get less relief in the incisal region, and in the normal child, where relief is not so badly needed, you get more.

I propose to show a few extreme examples of migrations. The first two cases had $\frac{e,d,b,a \mid a,b,d,e}{e,d,b,a \mid a,b,d,e}$ removed at 4 years of age owing to caries. $\frac{c \mid c}{c \mid c}$ were not a sufficient prop to keep the jaws apart and consequently the lower jaw swings upward and forward. When the incisors erupt the lowers are in front of the upper. One child was of deficient growth and the other of approximately normal growth. The lag in forward growth of the upper incisal region is much more marked in the child with deficient growth. The third case, a normal growing child, had $\frac{e,d \mid d,e}{e,d \mid d,e}$ removed at 6 and 8 years of age on account of caries. $\frac{6 \mid 6}{6 \mid 6}$ were removed at 11 years of age with the idea of prevention of crowding. The spaces in the upper arch have closed by the forward drift of $\overline{7 \mid 7}$ which had rotated mesiolingually. $\underline{5,4 \mid 4,5}$ rotated in opposite directions. In the lower jaw $\overline{5 \mid 5}$ had been left behind in the forward growth as they had developed so low down and had lost their guide, the roots of $\overline{e \mid e}$, to bring them forward. They are in contact with $\overline{7 \mid 7}$, leaving a large gap between the premolars. It is a good example of the greater forward drift of upper molars compared with lower molars. In both upper and lower the anterior segments have kept growing forward and there is no marked reduction in the facial outline. In similar cases of deficient growth the anterior segments, both upper and lower, lag behind, the spaces close from behind, and there is a very marked reduction in the facial outline. The radiographs show change of direction of $\overline{5 \mid 5}$ over a period of three years—no treatment.

SUMMARY

The evidence of normal growth and the development of occlusion show that all teeth are moving forward. No evidence is available that teeth move backward.

If spaces where teeth are extracted are closed, it is by the drifting forward of the teeth distal to the gap. Certain teeth, especially $\overline{5}$ after the loss of $\overline{e}$, can be left behind in the forward movement.

A difference in degree of forward movement anterior and posterior to a break in the continuity of the arch is observed in individuals with normal or deficient growth.

News and Notes

American Board of Orthodontics

The 1946 meeting of the American Board of Orthodontics will be held at the Broadmoor Hotel, Colorado Springs, Colorado, Sept. 26, 27, 28, and 29, 1946. Orthodontists who may desire to be certificated by the Board may obtain application blanks from the Secretary, Dr. Bernard G. deVries, 705 Medical Arts Building, Minneapolis 2, Minnesota.

American Association of Orthodontists

It has been announced that the Antlers Hotel, in Colorado Springs, Colorado, is in a position to take care of guests for the meeting of the American Association of Orthodontists who may be unable to secure accommodations at the Broadmoor, the headquarters hotel.

The meeting will be held in Colorado Springs, Sept. 30, Oct. 1, 2, and 3, 1946. Reservations should be made quite some time in advance.

Pacific Coast Society of Orthodontists

The Pacific Coast Society of Orthodontists will hold its convention in San Francisco, California, May 27, 28, and 29, 1946.—Dr. Earl F. Lussier, Secretary, 450 Sutter Building, San Francisco, California.

Outlook for Women in the Health Services*

In Bulletin 203 of the United States Department of Labor, Women's Bureau, the outlook for women in occupations in medicine and other services is carefully covered.

This pamphlet is one of a series prepared by the Women's Bureau to present the postwar outlook for women in particular occupational fields. Many of the 13 million women who were working before the war, as well as some of the 5 million who have joined them since, must continue to support themselves and their many dependents. Like their younger sisters in schools and colleges, they are confused by the sometimes glowing and sometimes dark predictions regarding their future opportunity for employment.

Many monographs are available that describe an occupation at a particular time in its prewar or wartime setting. But no detailed studies have been published that show the considerable changes that have taken place during the war and the effect of these changes that take place on the postwar supply of and the demand for women in particular occupational fields. This pamphlet presents such a dynamic study as distinct from a static description. It discusses the prewar situation, the wartime changes, and the postwar outlook for women in one of the occupations in the field of medical and other health services, in which women in 1940 composed almost two-thirds of the workers.

*Excerpts from Bulletin 203, United States Department of Labor.

Because of the pressing demand for this type of information, some of the occupational discussions in this field are being issued separately as they are completed. An over-all pamphlet will coordinate the series and discuss the general trends affecting the many women employed in these services so important to the nations whether at peace or at war.

In discussing the outlook for women dentists the recently completed booklet goes on to say, "Although no organized attempt has been made to recruit women for dentistry, some of the schools during the war period have definitely appealed to young women to enter this field. The outlook for them, like that of men, is good in the face of increasing demand for service and a waning supply of trained personnel. In the past, women have succeeded in all types of dental work not only as general practitioners but also in school programs, in public health work in State and local health departments, and as specialists, especially in work with children (pedodontics) and in treating diseases of the gums (periodontics).

Oral surgery is the only specialty in which women dentists seldom engage exclusively, although the average woman in general practice does extracting and minor oral surgery as well. The American Society of Oral Surgeons reports that no applications for membership have ever been received from women, although those with five years' experience in practicing oral surgery and exodontia exclusively are eligible. The Academy of Denture Prosthetics likewise has no women members. On the other hand, of 205 members of the American Academy of Periodontology, 13 (6 per cent) are women, and of the 420 active members of the American Society of Dentistry for Children at least 39 (9 per cent) are women. Membership in this association is not limited, however, to those who engage in work with children exclusively.

There is and may continue to be prejudice on the part of a few who will not avail themselves of the service of a woman dentist or a woman physician solely because she is a woman. Habit may condition others to prefer male dentists. In 1939, over 40 per cent of the women dentists cooperating in a study conducted by the Women's Institute of Professional Relations noted the existence of prejudice against women as an outstanding difficulty in the practice of their profession. However, women dentists seem to agree that they are apt to be too busy rather than not busy enough. There is no evidence that they fared badly even in depression years.

For the young woman with a pleasing personality who combines intelligence with mechanical ability and dexterity, who likes science, and who can relate cause and effect, dentistry offers a promising career. Added to these basic qualifications, she should have enough business sense to manage an office or enough teaching ability to like the educational aspects of public health work.

More scholarships are needed to help finance the predental and early years of dental school for girls who are interested and qualified to prepare to become dentists. Less restricting on one's personal life than the ordinary practice of medicine because of the more regular hour arrangements, the practice of dentistry can readily be combined with average homemaking responsibilities. In the future, it can and probably will absorb considerably more than the 1,000 women who before the war were engaged in this significant service."

In thumbing through this very interesting booklet, that seems to be published for the purpose of encouraging women to study the professions, it is easy to get the impression that the department of labor is looking ahead, particularly in the preventive field of dentistry for children.

War Service and Post War Planning Committee American Dental Association

An open forum, under auspices of War Service and Post War Planning Committee, American Dental Association, was held at 9:30 A.M., Feb. 9, 1946, Room 2, Stevens Hotel, Chicago, Ill.

Dr. C. Willard Camalier, Chairman, Presiding.

9:30 Opening Address
Dr. Walter Scherer, President, American Dental Association
10:00 Demobilization of Dental Officers
Major General Robert H. Mills, Chief, Dental Division, U. S. Army
Rear Admiral A. G. Lyle, Chief, Dental Division, Bureau of Medicine and Surgery, U. S. Navy
11:15 Dental Officer Returns to Civilian Practice—Problems and Remedies
Dr. C. W. Freeman, Chairman, Post War Planning Committee, Illinois State Dental Society
12:00 Noon. Recess
1:45 Address
Dr. Sterling V. Mead, President-Elect, American Dental Association
2:00 Surplus Dental Materiel
Hon. Watson B. Miller, Federal Security Administrator
3:00 Dr. Allen O. Gruebbel, Chairman of Special Committee, Veterans Administration, appointed by Board of Trustees, introducing
Dr. Milburn M. Fowler, Chief of Dental Division, Veterans Administration
Subject: Dental Care Program of the Veterans Administration
4:00 Memorial for Dental Officers
Suggestions for type and recommendations for future action
5:00 Adjournment

Notes of Interest

Dr. Carl R. Anderson is resuming his practice of orthodontics and will be located at his former address, 402 Loraine Building, Grand Rapids, Michigan.

Lt. Col. George B. Broadhurst announces the reopening of his office, 420-422 University Club Building, Grand and Washington Avenues, St. Louis 3, Missouri. Practice limited to exodontia and oral surgery.

Major Walter L. Eckardt announces the reopening of his office, 930-34 Arcade Building, St. Louis, Missouri. Practice limited to oral surgery, exodontia, diagnosis, and radiography.

J. Hilliard Hicks. D.D.S., M.S., recently released from the United States Army, announces that he will resume the practice of orthodontics associated with Oliver W. White, D.D.S., M.S., 213 David Whitney Building, Detroit, Michigan.

Dr. Marius L. Poles wishes to announce that he has retired from the general practice of dentistry. Practice limited to orthodontics, at 44 Church Street, Paterson, New Jersey.

John S. Voyles, D.D.S., will open an office at 425 DeBaliviere Avenue, St. Louis, Missouri, about March 15, 1946.

Dr. J. Russell Winston announces his return to civilian practice and association with Dr. Louis S. Winston in the exclusive practice of orthodontics, 4115 Fannin Street, Houston 4, Texas.

OFFICERS OF ORTHODONTIC SOCIETIES*

American Association of Orthodontists

President, Archie B. Brusse - - - - - - - - - - 1558 Humboldt St., Denver, Colo.
President-Elect, Earl G. Jones - - - - - - - - - 185 East State St., Columbus, Ohio
Vice-President, Will G. Sheffer - - - - - - - - Medico-Dental Bldg., San Jose, Calif.
Secretary-Treasurer, Max E. Ernst - - - 1250 Lowry Medical Arts Bldg., St. Paul, Minn

Central Section of the American Association of Orthodontists

President, Arthur C. Rohde - - - - - - - - 324 E. Washington Ave., Milwaukee, Wis.
Secretary-Treasurer, L. B. Higley - - - - - - - 705 S. Summit St., Iowa City, Iowa

Great Lakes Society of Orthodontists

President, Willard A. Gray - - - - - - - - - Medical Arts Bldg., Rochester, N. Y.
Secretary-Treasurer, C. Edward Martinek - - - - - 661 Fisher Bldg., Detroit, Mich.

New York Society of Orthodontists

President, Raymond L. Webster - - - - - - - - - 155 Angell St., Providence, R. I.
Secretary-Treasurer, Norman L. Hillyer - - - - - Professional Bldg., Hempstead, N. Y.

Pacific Coast Society of Orthodontists

President, J. Camp Dean - - - - - - - - - - - 1624 Franklin St., Oakland, Calif.
Secretary-Treasurer, Earl F. Lussier - - - - - - 450 Sutter St., San Francisco, Calif.

Rocky Mountain Society of Orthodontists

President, Henry F. Hoffman - - - - - - - - - 700 Majestic Bldg., Denver, Colo.
Secretary-Treasurer, George H. Siersma - - - - - 1232 Republic Bldg., Denver, Colo.

Southern Society of Orthodontists

President, J. E. Brown - - - - - - - - Merchants National Bank Bldg., Mobile, Ala.
Secretary-Treasurer, Leland T. Daniel - - - - - 407-8 Exchange Bldg., Orlando, Fla.

Southwestern Society of Orthodontists

President, Brooks Bell - - - - - - - - - - - Medical Arts Bldg., Dallas, Texas
Secretary-Treasurer, James O. Bailey - - - - - Hamilton Bldg., Wichita Falls, Texas

American Board of Orthodontics

President, Frederic T. Murlless, Jr. - - - - - - 43 Farmington Ave., Hartford, Conn.
Vice-President, Joseph D. Eby - - - - - - - - 121 E. 60th St., New York, N. Y.
Secretary, Bernard G. deVries - - - - - - - - Medical Arts Bldg., Minneapolis, Minn.
Treasurer, Oliver W. White - - - - - - - - 213 David Whitney Bldg., Detroit, Mich.
James D. McCoy - - - - - - - - 3839 Wilshire Blvd., Los Angeles, Calif.
Claude R. Wood - - - - - - - - - - Medical Arts Bldg., Knoxville, Tenn.
James A. Burrill - - - - - - - - - 25 E. Washington St., Chicago, Ill.

*The Journal will make changes or additions to the above list when notified by the secretary-treasurer of the various societies. In the event societies desire more complete publication of the names of officers, this will be done upon receipt of the names from the secretary-treasurer.

Harvard Society of Orthodontists

President, Francis J. Martin - - - - - - - - - - - - 1074 Centre St., Newton, Mass.
Secretary-Treasurer, Edward I. Silver - - - - - - - - 80 Boylston St., Boston, Mass.

Washington-Baltimore Society of Orthodontists

President, Francis M. Murray - - - - - - 1029 Vermont Ave., N.W., Washington, D. C.
Secretary-Treasurer, William Kress - - - - - - - Medical Arts Bldg., Baltimore, Md.

St. Louis Society of Orthodontists

President, Virgil A. Kimmey - - - - - - - 3722 Washington Ave., St. Louis 8, Mo.
Vice-President, Leo M. Shanley - - - - - - - 7800 Maryland Ave., Clayton 5, Mo.
Secretary-Treasurer, Everett W. Bedell - - - - - 1504 S. Grand Blvd., St. Louis 4, Mo.

Philadelphia Society of Orthodontists

President, Frederick R. Stathers - - - - - - - - - - 269 S. 19th St., Philadelphia, Pa.
Vice-President, William B. Jones - - - - - - - - - 255 S. 17th St., Philadelphia 3, Pa.
Secretary-Treasurer, Augustus L. Wright - - - - - 255 S. 17th St., Philadelphia 3, Pa.

Foreign Societies*

British Society for the Study of Orthodontics

President, R. E. Rix - London, England
Secretary, K. E. Pringle - - - - - - - 12, Manchester Square, W. 1, London, England
Treasurer, Harold Chapman - - - - - - 6, Upper Wimpole St., W. 1, London, England

Sociedad de Ortodoncia de Chile

President, Alejandro Manhood - - - - - - - - - - - - - - Avda. B. O'Higgins 878
Vice-President, Arturo Toriello - - - - - - - - - - - - - - - - Calle Londres 63
Secretary, Rafael Huneeus - - - - - - - - - - - - - - - - - Calle Agustinas 1572
Treasurer, Pedro Gandulfo - - - - - - - - - - - - - - - - - - Calle Londres 63

Sociedad Argentina de Ortodoncia

President, Vicente A. Bertini
Secretary, Ludovico E. Kempter
Treasurer, Edmundo G. Locci

Sociedad Peruana de Ortodoncia

President, Augusto Taiman
Vice-President, Ricardo Salazar
Secretary, Carlos Elbers
Treasurer, Gerardo Calderon

Asociación Méxicana de Ortodoncia

President, Guillermo Gamboa - Madero 34-3
Secretary, Rutilio Blanco - Donceles 98-209
Treasurer, Carlos M. Paz - Av. Insurgentes 72

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*The Journal will publish the names of the president and secretary-treasurer of foreign orthodontic societies if the information is sent direct to the editor, 8022 Forsythe, St. Louis 5, Mo., U. S. A.